Essays on the Effects of Foreign Direct Investment on Economic Growth and Welfare: The Case of Sub-Saharan Africa

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Abstract

This study examines the impact of foreign direct investment (FDI) flows on economic growth and welfare in Sub-Saharan Africa (SSA). Following the growing consensus among scholars that the effects of FDI on growth in developing countries depends on domestic factors in the host countries, the first part of this study examines the role of four domestic factors – human capital, financial development, institutions and infrastructure – in facilitating the effects of FDI on growth in 44 SSA countries for the period 1981-2010. Using a dynamic panel growth model, and the two-step system GMM estimation of Blundell & Bond (1998) and Arellano & Bover (1995), this study finds mixed results regarding the impact of domestic factors on the relationship between FDI and growth in SSA. The study finds evidence to show financial sector and institutional development serves to enhance effects of FDI on growth in the SSA. However, contrary to Borensztein et al. (1998), this study finds that human capital development has a negative impact on the FDI-growth nexus, and the same holds for infrastructural development. These results are robust to other factors that affect growth in SSA.

The second part of this study explores the impact of FDI flows on economic welfare in SSA. The study tests the hypothesis that FDI flows to SSA improves economic welfare in the region. Given the high levels welfare inequality in the region both across and within countries, this study seeks to investigate the impact of FDI flows across different levels of welfare. Using quantile regression (QR) estimation techniques for 47 SSA countries covering the period 1990-2011, this study finds that the impact FDI flows on welfare depends on the level of welfare already attained. The results show that increased FDI improves economic welfare for those countries in the higher wel-

fare quantiles while the impact on countries in the middle to lower quantiles is either negative or insignificant. The results are robust to several other factors that known to affect economic welfare.

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Chapter 1

Introduction

1.1 Statement of the Problem

In the last couple of decades foreign direct investment (FDI) has been perceived by many scholars as the most important source of external finance to developing countries. This proves particularly true for Sub-Saharan Africa (SSA) countries, as they lack enough savings to undertake major investment projects. The importance of FDI as a source of external finance to SSA countries is evident in the efforts of these countries to attract these foreign investors. Sub-Saharan African countries have succeeded in attracting more FDI flows in the last two decades mainly through major policy changes towards foreign investors. These changes in policy came mostly in response to calls by the International Monetary Fund (IMF) and leading industrialized countries for developing countries to liberalize their capital accounts. As a result most SSA countries began adopting more flexible and FDI-friendly policies in the early 1990s. Moreover, the decline in foreign aid flows to the region in the 1990s [1] served as further motivation for the easing of restrictions on cross-border capital flows, thus opening up these countries to unprecedented flows of foreign capital. This led to an increase in the flow of FDI to SSA beginning in the mid-1990s (see Table A.1). Net foreign investments flows into the region averaged US$ 942.2 million and US$ 1,313.4 millions in

[1] See Figure A.3 in the appendix

the 1970s and 1980s respectively. This almost quadrupled to US$ 4,820.6 millions in the 1990s when SSA countries began easing restrictions on cross border capital flows, and reaching record levels in the 2000s when it averaged US$ 20,266.6 million. In the last three years, 2010-2012, FDI flows averaged nearly US$ 38 million with annual flows topping US$ 40 millions in 2011 and 2012. These figures are small relative to other FDI flows to other regions listed Table A.1, but they represent significant improvements for the SSA region in terms of the ability to attract FDI.

Moreover, development aid declined due to austerity measures by some EU countries following the 2007/2008 global financial crises, this coupled with the fact that SSA countries continue to be savings deficient means these countries have to continue relying on private foreign capital flows for most their investment needs. Foreign direct investment remains the preferred source of private foreign capital for most developing countries, because of its perceived role in economic development through job creation, technology transfer, increased productivity, and economic growth. Advocates for increasing FDI flows to developing countries cite these and other potential benefits to the host countries. In addition, FDI is relatively stable (i.e. less prone to reversals) as most foreign direct investors tend to undertake long term projects, which often do not yield immediate returns.

However, although FDI is considered desirable for developing countries, questions remain regarding its potential benefits to these countries, questions such as: Does FDI promote economic growth by itself or does it contribute to growth through existing domestic factors? Does FDI improve economic welfare in host countries? Does it boost the productive capacity of host countries, especially in SSA? To what extent does FDI contribute to job creation, technology transfer, human capital development and productivity growth? Answers to these questions could provide further understanding regarding the role of FDI in developing countries. In spite of the extensiveness of the literature on FDI flows to developing countries, many of these questions remain largely unanswered. Notably many prominent studies on FDI flows to developing countries focus on examining the effects of FDI on growth. For example Borensztein et al. (1998), Carkovic & Levine (2002), Aitken & Harrison (2001), Alfaro (2003), Alfaro et al. (2010), Balasubramanyam et al. (1996),

Adams (2009) and Prasad et al. (2007). However, major disagreements continue to plague the literature on the effects of FDI on growth, and moreover, this literature fails to adequately address this issue in the context of the SSA region.

The purpose of this study is to examine the impact of FDI flows on economic development in SSA countries by addressing two issues on this topic. The first investigates how FDI could promote economic growth in the region. Different theoretical and empirical explanations exist on how FDI could influence economic growth in developing countries: some studies emphasize human capital Borensztein et al. (1998), while others point to financial development Durham (2004) and Alfaro et al. (2010). Other authors stress the role of institutions Busse & Groizard (2008) and Durham (2004), and others claim it depends on the sector through which FDI enters the economy Alfaro (2003). The issues addressed in these studies could be summed up into one simple question, "*how does foreign direct investment promote growth*", and the one clear answer that emerges from all of these studies is that domestic factors play an important role in enhancing the role of FDI in promoting economic growth in developing countries. The first part of this study therefore seeks to investigate this issue in the context of sub-Sahara Africa. The need to investigate this issue for the SSA region arise from the recognition that broad generalizations of results from empirical studies including large groups of countries, as noted by Asiedu (2002), do not accurately describe the SSA situation. This study investigates the role of domestic factors in facilitating the effects of FDI on economic growth in the region. Growth in SSA has not kept pace with the huge inflow of foreign capital, annual growth rate dropped from an average of 5.63% in 2001-2006 to an average 4.63% in the period 2007-2012. Moreover, SSA has made relatively less significant progress in terms of many development indicators - for example life expectancy, infant mortality, and the human development index. This study argues that one of the biggest challenges in achieving the region's development goals lies in getting it right with foreign direct investment, and for this to happen, a thorough understanding of the nexus between FDI and growth vis-a-vis the host country factors could provide some answers. The reasoning is that sub-Saharan Africa needs a sub-Saharan African solution and the best way to achieve this involves examining the region's development

questions separately from other developing countries.

The second part investigates the impact of FDI on welfare in SSA countries. Although growth remains the most important metric for evaluating economic development, this study while recognizing the importance of growth argues that it represents a flawed measure of a country's economic welfare. This is because, although growth encompasses most economic activities in an economy, it remains mute on the distribution of the economy's output. The literature on this issue is relatively thin with just a handful of studies among them Bhagwati et al. (1987), Blalock & Gertler (2008), Balcao Reis (2001) and Balcao Reis (2006). None of these studies directly address this issue in relation to SSA. Therefore to further investigate the effects of FDI in SSA, the second part of this study examines the effects of increased FDI flows on economic welfare in the region, the main purpose being to investigate whether the effects of FDI depends on the level of welfare. This question proves to be particularly important, because a country's main goal for pursuing economic development is to improve the economic well being of its people. Understanding the role of FDI in this regard is crucial to the development goals of these countries. The reason this study focuses on differences in levels of economic welfare derives from the recognition that high income inequality is prevalent in SSA, and this is reflected in economic well being in the region. It therefore proves important to investigate whether and to what extent the effects of FDI on welfare depends on levels of welfare.

In light of the issues highlighted above, and in recognition of the underlying fact that the primary purpose of pursuing policies to attract FDI flows is to promote a country's development, this study therefore answers two main questions:

1. How does foreign direct investment promote growth in sub-Saharan Africa?

2. Does foreign direct investment improve economic welfare in Sub-Saharan African countries?

These questions are designed to understand the implications of FDI flows for development in the SSA region, and the answers will extend the discussion on the role of FDI flows to this region. On the first question, the study finds that two of the four domestic factors examined boost the effects of

FDI on growth while the others have a negative effect on this relationship. On the welfare effects, this study finds evidence that the impact of FDI on welfare depends on the level of welfare at which the impact is being evaluated. The results are discussed further in the conclusions.

1.2 Main Contributions

This study makes two major contributes to the literature on FDI in Sub-Saharan Africa. First by examining the role of domestic factors in influencing the impact of FDI on economic growth in the region. To my knowledge this represents the first study to specifically investigate the question of how FDI may promote growth in SSA using domestic factors. The second main contribution relates to the question of the efficacy of FDI on for improving economic welfare in SSA countries. This issue has been marginally treated with only a handful of studies attempting to answer this question, none of which is on SSA.

Following two decades of unprecedented FDI flows to the region, this study investigates the impact of these on economic development in SSA in a manner that has not been done before.

Chapter 2

Foreign Direct Investment and Growth in Sub-Saharan Africa: What are the Channels?

2.1 Introduction

Does foreign direct investment promote economic growth in developing countries? This has been and remains one of the most hotly debated issues in Development Economics over the last couple of decades. Authors have offered varying explanations of the determinants of growth in developing countries, and FDI has been one of the channels believed to boost growth in these countries. Arguably the most important topic in development circles, growth remains a central issue and proves to be crucial as developing countries continue in their quest to catch up with more affluent nations.

Foreign capital flows (mostly in the form of FDI) continue to be considered as one of the most important factors for promoting growth in developing countries. This has resulted to a burgeoning number of studies on the nexus between FDI and economic growth, particularly as developing countries seek to achieve the Millennium Development Goals (MGDs). However, despite the large body of literature on this subject, significant disagreements and irreconcilable differences remain

as the debate on the effects of foreign capital flows on growth in recipient countries continues. Studies on this issue span a wide area, from those that investigate the effects of foreign capital flows in general[1] on growth (Rodrik & Subramanian (2009), Prasad et al., 2007, Bresser-Pereira & Gala, 2009), to those more focused on exploring the FDI-growth nexus (Alfaro, 2003, Alfaro et al., 2006, Balasubramanyam et al., 1996, Carkovic & Levine, 2002). The strongest arguments against the hypothesis that foreign capital contributes to economic growth come from the studies that use an all inclusive definition foreign capital flows. This is not surprising given the general composition of these flows - which includes portfolio investments, debt, FDI and other forms of foreign capital flows. These different forms of foreign capital often enter the host countries in different forms and with different objectives. Those studies that focus on the FDI-growth nexus on the other hand, tend to find some evidence to support the hypothesis that FDI promotes economic growth (e.g. Alfaro (2003) and Alfaro et al. (2006)), with a few strongly arguing the opposite (e.g. Carkovic & Levine, 2002), yet others find the effects of FDI on growth to be conditional on other factors. These are discussed further in the remainder of this intriduction.

Some research studies that examine the effects of FDI on economic growth have focused on investigating the *channels* through which FDI may promote growth. Two prominent studies in this area include Durham (2004) and Borensztein et al. (1998). Durham (2004) argues that foreign investment - both FDI and portfolio investments - "do not have direct , unmitigated positive effects on growth", adding that their effect on growth depends on the absorptive capacity of the host country through financial sector and institutional development. Borensztein et al. (1998) on the other hand posits that foreign investment only promote economic growth beyond a given threshold level of human capital development. Other studies that cite financial development as a vehicle for enhancing the growth effects of FDI include Alfaro (2003) and Alfaro et al. (2010). The general conclusion from these and similar studies that base the growth effects of FDI on host country factors, states that host should design policies to promote the development of these inter-mediating factors to complement FDI in other to maximize its growth effects. However, the samples in most

[1] Studies in the category often examine the issue from the stand point of the effects of capital account liberalization on growth

of these studies often cover large groups of countries spanning different regions, in most cases based on data availability. Moreover, the literature review does not include any studies that focuses specifically on SSA. This study argues that no one-size-fits-all answer exist to the above questions because economies from different regions posses features - economic, social, political etc - that set them aside from the others. Thus, the results could have different implications for countries in different regions or even for countries within the same region. Moreover, the research findings could be more representative of countries in a sample if the the countries do not have significant disparities. Thus, as the question shifts from "*whether* FDI promotes growth? to "*how does* FDI promotes growth?", this study answers this question in the context of SSA countries by examining the factors that could enhance the effects of FDI on growth in the region. This is in recognition of the fact that the significance of the impact of different inter-mediating factors could depend on regional differences or the development status of the countries in the sample.

This study extends the discussion of the effects of FDI on growth first by focusing on the sub-Saharan African region, whose countries rank consistently in at the bottom in most indicators of economic development. The reason for focusing on this region derives from the need to seek a solution that works for the region. The extension also involve examining the role of specific domestic factor in the relationship between FDI and growth. The factors to be examined include human capital, institutions, the financial sector, and infrastructure. Although these factors have been identified as strategic determinants of growth and development, this study finds some may play an important role when it comes to the FDI-growth relationship.

The rest of the chapter is organized as follows: the remainder of this section discusses the motivation and states the hypothesis of the study. I review the empirical literature on the relationship between FDI and growth in Section 2.2, followed by a discussion of the data in Section 2.5. Section 2.3 discusses of the four domestic factors whose influence on the FDI-growth relationship this study seeks to investigate. Section 2.4 presents the model and a discussion of the estimation methodology used. I present and discuss the findings in Section 2.6 and Section 2.7 concludes.

Purpose and Motivation

Responding to calls by the World Bank and some industrialized countries for developing countries to liberalize their capital accounts, Sub-Saharan African countries shifted positions with respect to their policies towards foreign investors within the last two decades, offering favorable incentive packages to attract foreign investors, through an overhaul of their investment policy frameworks. The need for these countries to seek foreign investments grew particularly in the decade of the 1990s when development aid saw a dramatic decline, see Figure A.3. Borensztein et al. (1998) claim that "these policies may result in a flow of foreign investment that does not respond to higher efficiency, but only to profit opportunities created by distorted incentives". However, many scholars and policy makers continue to argue for an increase in FDI flows to SSA, citing long-term growth and job creation among other potential benefits. Proponents of increasing FDI flows to developing countries argue that foreign investors have lower costs of introducing new technologies to developing countries because these investors possess the technological know-how, and that the vehicle for spreading this technology to developing countries is through FDI flows from industrialized countries, (Borensztein et al. (1998)). This makes the empirical evaluation of the performance of FDI in developing countries an appealing question, and this study seeks to investigate as a first step whether FDI promotes growth in SSA, and secondly and most important through what channels this can be achieved. This study is particularly relevant because SSA countries have seen record FDI flows in the past two decades, although the region's share of FDI as a percentage of the rest of the world continues to be meager, see Figure A.2. Questions however remain as to whether these increased FDI flows translate into improved growth performance not only in SSA, but in developing country in general. This study focuses on SSA because even though countries in this region continue to occupy the bottom quarter of the Human Development Index (HDI), the region has lots of potential for boosting economic growth and development if it can harness its natural and human capital resources combined with the "right kind" of FDI. It is important therefore to investigate whether FDI flows do combine with existing domestic factors to promote growth in the region.

The Hypothesis

This study investigates the effects of selected domestic factor on the relationship between foreign investment flows and economic growth in sub-Saharan African countries, thus the hypothesis for each of the four factor used in the study may be slightly different. However, the general hypothesis of the study is that, "*domestic factors positively impact the relationship between foreign direct investment and economic growth in sub-Saharan Africa*". I test this hypothesis by examining the effects of each of the four domestic factors on the relationship between FDI and growth. The main question I hope to answer is "does FDI promote growth, or do domestic factors play a role in this relationship?" This questions addresses questions about the quantitative impact of FDI flows in the region.

2.2 Literature Review

The question, "does FDI promotes economic growth", has been debated for over two decades, but no clear and unequivocal answers exist to this question. This topic remains important in the development literature because most developing countries rely on private foreign capital (mostly in the form of FDI) to finance their investments projects. In this respect, research on the impact of FDI flows on growth continue to be relevant, in the search for answers to the FDI-growth nexus. Different theoretical explanations exist on how FDI can influence economic growth; some authors have emphasized human capital, (Borensztein et al., 1998), while others point to financial development (Alfaro, 2003) and (Alfaro et al., 2006). Other studies have examined other factors which include institutions Busse & Groizard (2008), the initial level of development (Blomstrom et al., 1994), and trade policy (Balasubramanyam et al., 1996). Some studies claim that the effects of FDI on growth depends on the sector through which FDI enters the economy Alfaro (2003). The results from most studies on this topic remain mixed, and those that find a positive effect of FDI on growth in developing countries credit this positive effect on host country factors. This suggests therefore that FDI by itself does not necessarily lead to growth, but that growth from FDI is facilitated by

host country factors.

In one of the most cited studies in the FDI-growth literature, Borensztein et al. (1998) concludes "the effect of FDI on economic growth depends on the level of human capital available in the host economy", adding that countries require a threshold level of human capital beyond which they could realize the the positive impacts of FDI on growth. In a study of 69 developing countries for the period 1970–1989 and using FDI flows exclusively from the OECD countries, the authors argue that FDI has a greater effect on growth only when the host country has a high absorptive capacity in the form of developed human capital. This argument falls in line with the predictions of the endogenous growth theory, which predicts that investment in human capital contributes significantly to growth. However, although they provide a rationale for using FDI flows exclusively from OECD countries, it should be noted however that new and important sources of capital transfers have emerged through the South-South FDI flows. This holds particularly true for SSA countries where FDI from Asia has emerged as one of the main vehicles for the transfer of foreign capital. This study therefore uses aggregate FDI flows to SSA from all sources in answering the research question posed in this study. In a related study, Durham (2004) argues that FDI does not have a direct unmitigated positive effect on economic growth, adding that financial development and institutions play an important role in enhancing the growth effects of FDI by enhancing the absorptive capacity of the host countries.

Other authors examine the topic from the point of view of financial market development. For example, and Alfaro et al. (2006) and Alfaro et al. (2010) posit that an increase in the share of FDI promotes growth only in financially developed economies. A deep financial sector they explain benefits the host country through backward linkages between foreign and domestic firms. They also emphasized the importance of local factors such as market structure and human capital in generating positive spillovers from FDI. In another study that reviews the literature on the growth effects of FDI in developing countries, Adams (2009) added that FDI contributes to development through the augmentation of domestic capital and enhancement of technology through the transfer of technology, skills and innovation. All of these studies support the view that domestic factors

play an important role in enhancing the growth effects of FDI, in line with the predictions of the endogenous growth theory.

Some studies link the effects of FDI on growth with the sector through which FDI enters the host country. For example, in an empirical analysis using cross-country data from 47 countries for the period 1981-1999, Alfaro (2003) investigate the role of different sectors in the relationship between FDI and growth. This study finds that the effects of FDI on growth depend on the sector through which FDI enters the host country. The paper conclude that FDI contributes to growth only when it enters the host country through the manufacturing sector, adding that FDI flows through the primary sector have a negative effect on growth while the results are ambiguous for FDI entering through the services sectors. These findings prove to be particularly interesting in the context of SSA countries, because FDI flows to the region go predominantly to the primary and services sectors.

According to UNCTAD reports in the World Investment Report UNCTAD (2012), oil and gas producing countries receive most of the FDI that flows into SSA with Nigeria and Angola alone accounting for over a fifth of all FDI flows the region in 2011. This may have significant implications for the effect of other factors on the FDI-growth nexus. In a related study, Alfaro & Charlton (2007) using industry level data from 29 countries for the period 1985-2000, find that FDI increases growth when we account for the "quality" of FDI, adding that FDI at the industry level contributes to higher growth. Again the issue of the quality of FDI raises questions about types of FDI SSA countries need to pursue, not only for short term growth, but to build production capacity for sustained long run growth. Balasubramanyam et al. (1996) investigate the effect of FDI on growth in export promotion versus import substitution countries. They find support for Bhagwati's Hypothesis , and conclude that FDI contributes to growth more in countries that encourage an outward looking trade policy (i.e. export promotion) as opposed to countries that promote import substitution. This brings to light the issue of openness as an enabling condition for FDI to promote economic growth. Aitken & Harrison (2001) also show that the size of the firm and type of ownership are important in determining whether or not FDI promotes growth in developing countries. In

a micro study of Venezuelan firms for the period 1979-1989, this study finds that domestic firms with less than 50 employees benefit from FDI through an increase in productivity. However, they also find that increases in FDI have a negative effect on firms that are wholly domestically owned, conclude that the net benefits of FDI are small. However, the finding that FDI negatively affects wholly domestic firms stands counter to the argument that FDI promotes technology transfer which benefits domestically owned firms.

As mentioned in the beginning of this review, no consensus exists on the positive effects of FDI in developing countries. Several studies have found completely opposite results on the effects of FDI on growth. For example, Bresser-Pereira & Gala (2008) argue that an increase in FDI in the form of foreign savings leads to an appreciation of the exchange rate, a rise in wages, and an increase in consumption. This, they argue, results in borrowing to finance a country's consumption rather than to invest, thus the country grows less. Another push back on the argument that FDI promotes growth comes from Prasad et al. (2007) who posits that non-industrial countries which have relied on foreign capital have not grown faster than those countries that have not relied on these flows, adding that foreign capital has a greater impact on growth only in industrial countries. They argue that developing countries have limited absorptive capacity for foreign capital inflows because of the existence of weak financial markets, and because these countries are prone to currency overvaluation. This is probably one of the harshest critiques of the idea that FDI promotes growth in developing countries. Furthering the argument against the FDI-growth effect, Carkovic and Levin (2008) using both cross-sectional and panel data techniques for 72 countries, found no robust causal relationship between FDI and growth.

Thus as posited by Duncan (2004), the main conclusion from the works reviewed in this literature is that the growth effects of FDI are conditional on prevailing domestic factors. As a result, research on this issue must be focused instead on investigating the channels through which FDI can promote growth in developing countries. The next section examines the factors or channels with a discussion of how each is expected to affect the relationship between FDI and growth in SSA.

2.3 The Channels

This study examines four endogenous factors among those that have been identified by researchers to have a positive influence on the FDI growth nexus effect on growth either directly or indirectly through FDI. These include the level of human capital, the financial sector, institutions and infrastructure. Vast literature exists on the contributions of each of these factors to economic growth, and this literature has generated much debate regarding the direct effects of these factors on economic growth. Other authors debate about the direction of causation between growth and some of the factors. This section gives a brief discussion of each of the four factors in the context of the question this study seeks to answer – that is, whether each promotes or boosts the effects of FDI on economic growth in SSA?

2.3.1 Human Capital

Through the endogenous growth theory, Lucas Jr (1988) famously predicted the role of human capital in promoting economic growth, and this has been backed up by many notable empirical studies, among Romer (1990) Romer (1989),(Barro, 1998, 2001), Barro & Lee (1993), De la Fuente & Domenech (2001) and Glomm & Ravikumar (1992). Studies have also shown human capital to be an important vehicle for the diffusion of technology Barro (2001), and Borensztein et al. (1998) concludes that the effects of FDI on growth depends on the level of human capital in the host country. Thus, human capital promotes economic growth both directly and indirectly through its effects on other factors. Consequently, this studies seeks to investigate the role of human capital in the relationship between FDI and growth in SSA. The study therefore tests the hypothesis that human capital promotes the growth effects of FDI flows in SSA. This study assumes that human capital development serves as a vehicle for the absorption of technology through FDI flows. Thus using the Barro-Lee data on educational attainment, which is used in most empirical studies on the effects of human capital on growth . This data is available at 5-year intervals beginning in 1950 and has been updated to include 146 countries. Another version of the Barro-Lee data is available

annually through the Summers' and Heston database on the Penn World Tables. Using this data, the main hypothesis this seeks to test is "human capital development serves as a vehicle to promote the growth effects of FDI by enhancing the absorption of FDI by host countries". Thus the expectation is that the sign of the interaction term between human capital and FDI will be positive and significant.

2.3.2 Financial Sector Development

Do developing countries need financial development to achieve high levels of growth or is financial sector development the by-product of growth and development? This question has been at the center of the debate on the relationship between financial development and growth. Some studies that financial development promotes economic growth, while others question the direction of causation between the two. Some of the most outstanding studies on this issue include Stiglitz (1989), Pagano (1993), King & Levine (1993), (Levine, 1997; Levine et al., 1999; Levine, 2005), (Khan & Senhadji, 2002). This study investigates what role, if any, financial development plays in the relationship between FDI and growth in SSA, and tests the hypothesis that "financial development enhances the effect of FDI on growth in the SSA". This hypothesis rests on the assumption that by allocating capital efficiently, a developed financial system allocates FDI to the most productive sectors of the economy, thus boosting its impact on economic growth. A developed financial system also serves as a catalyst for economic activities by facilitating the smooth flow of transactions. An important issue in studies on the relationship between financial development and growth has to do with determining the most appropriate indicator of financial development. This however depends in part on the development status of the country or region in consideration. For example, stock market capitalization represents a good indicator of financial sector development industrialized countries, but this measure is not readily available for most SSA countries, due to their relatively underdeveloped stock markets. This study uses three different indicators of financial sector development which have been widely used in studies dealing questions involving financial development and growth, the level of money supply, M2; credit provided by the banking sector

and credit provided to the private sector, as indicators of financial development.

2.3.3 Institutions

Institutions are defined as "a set of rules, compliance procedures, and moral and ethical behavioral norms designed to constrain the behavior of individuals in the interests of maximizing the wealth or utility of principles"[2]. They provide the atmosphere for healthy interactions both within and across countries by imposing constraints on actions. They define the rules of engagement in the daily dealings between individuals, businesses, and governments. Strong institutions provide the certainty and peace of mind required for a healthy economy. Hence, an economy with strong institutions may not only attract foreign capital, but these institutions would provide the necessary foundation and atmosphere for this capital inflow to contribute positively to growth and development in the recipient country. However, the issue relating to the relationship between institutions and growth has generated much debate in the economics literature, most notably between Acemoglu and Robinson on the one hand and Jeffery Sachs on the other[3]. Some outstanding works on this issue include Glaeser et al. (2004), Acemoglu et al. (2005) andAcemoglu & Robinson (2006). Acemoglu et al. (2005) argue that economic institutions matter for economic growth because they shape the incentives of key economic actors through their influence on investments and the organization of production. They argue that differences in economic institutions are the fundamental cause of differences in economic development, and maintain that some countries are much poorer than others because of differences in institutions. They also discussed the notion of a hierarchy of institutions, where political institutions determine the types of economic institutions of a country, and these economic institutions determine the economic outcomes. Shocks in the form of external influence and technological changes, they argue also affect political and economic institutions and hence economic outcomes. Thus, the threat by multi-national companies to boycott a country may force the government of that country to change its political institutions to adopt investment friendly

[2]North (1990) p. 201-202

[3]See for example McArthur & Sachs (2001) and Sachs (2003)

policies, which would in turn have a positive effect on economic institutions and hence growth.

As in the case of financial development, disagreements exist on the correct measure of institutional development. Glaeser et al (2004) discussed three main sources of data on the measures of institutions . The first is the International Country Risk Guide (ICRG) measures, which have been widely used, notably by Knack & Keefer (1995), Hall & Jones (1999) and Acemoglu et al. (2005). The second indicator called the Polity IV measures the limit to executive power, and collected by political scientists Jaggers & Marshall (2000). Lastly we have the aggregate index of survey assessments of government effectiveness, collected by Kaufmann et al. (2003). Other indicators of institutional development exist, but these three represent the most widely used in the literature. Glaeser et al. (2004) argue that these measures are "conceptually unsuitable" as indicators of institutional development because they reflect the "outcomes" of recent political developments in the countries being evaluated, and therefore do not meet the criteria of "permanence" and of exerting "constraints" on the governments. This study use the measures of institutions from the ICRG to test the hypothesis that "institutional development promotes the effects of FDI on growth in SSA".

2.3.4 Infrastructure

Infrastructure has a much broader meaning compared to the other factors discussed. It represents the foundation or basic framework on which all the other factors are built. A country's infrastructure includes its transportation and communication systems, energy and electricity, and water and sewage systems. However, infrastructure also includes government, economic, social, and cultural infrastructure. It is therefore fair to say that a country with a weak infrastructure has a weak foundation on which to build its development agenda, and thus experiences slow growth. However, as with the other factors, scholars disagree on whether infrastructural development leads to economic growth. For example, using US data for the period 1971–1986, Holtz-Eakin & Schwartz (1995) conclude that increasing infrastructure investment would have a negligible impact on productivity. In industrialized countries, investment in infrastructure may be funded publicly, privately or through partnerships between the public and private sector. However, in most developing countries,

especially in SSA, this investment is funded almost exclusively by the public sector. This study tests the hypotheses that: other things being constant, an improvement in a country's infrastructure will boost growth by providing the framework for meaningful investment to be undertaken.

It is important to note that the four factors discussed here are not exhaustive. As the literature shows, the effect of FDI on growth may depend on many domestic and even external factors besides the four examined in this study. This study limits the discussion to these four in order to enable a more detailed discussion. This study uses two measures of infrastructural development, namely the number of telephones per 100 people and the gross fixed capital formation. These are discussed further in Section 2.5.

2.4 Model and Estimation Methodology

2.4.1 The Model

Most empirical studies on growth have in the past used cross-country regression analysis to answer questions on growth issues. However, these studies rely on unrealistic assumptions about both the country specific effects and the endogeneity of the explanatory variables. The problems presented by these assumptions, in addition to the issues of measurement errors in the right hand side variables, often result to inconsistent and biased parameter estimates when the model is estimated using OLS. As a result, recent studies have relied on dynamic panel growth methods to estimate growth regressions, and these have proven to be more efficient. This study therefore estimates a dynamic growth model to test the hypothesis about the effects of the channels discussed in Section 2.3 on the relationship between FDI and growth. I estimate the model:

$$ln(gdp)_{it} = \beta_0 + \beta_1 ln(gdpc)_{i,t-1} + \beta_2 fdi_{it} + \beta_3 dfct_{jit} + \beta_4 \left(fdi \star dfct_j\right)_{it} + \gamma X_{it} + \mu_i + v_{it} \tag{2.1}$$

$$where \beta_1 = \tilde{\beta}_1 + 1$$

Where gdp is real GDP per capita, fdi is foreign direct investment flow as a percentage of GDP, $dfct_j$ is the jth domestic factor (where j =human capital, institutions, infrastructure, and financial sector development) that could enhance (if $\beta_2 > 0$) or mitigate (if $\beta_2 < 0$) the effects of FDI on growth, X is a vector of other control variables. μ_i and v_{it} represent the country specific effect and the idiosyncratic error terms respectively. The two parameters of particular interest in the above model are β_2 and β_4, and the main tool of analysis in this study is the derivative:

$$\frac{\partial ln(gdpc_{it})}{\partial fdi_{it}} = \beta_2 + \beta_4 dfct_j \tag{2.2}$$

Equation 2.2 measures the effects of FDI on growth for different values of each of the four factors examined in this study, holding the other factors constant. β_2 measures the direct effects of FDI on growth while β_4 measures the impact of the jth domestic factor on growth through its effect on FDI. Therefore, holding other determinants of growth in the model constant, an increase in FDI flows by one percentage point of GDP results to an increase in per capita GDP by $\left\{\left(e^{\beta_2+\beta_4 dfct_j}\right) - 1\right\} * 100\% \approx \left(\beta_2 + \beta_4 dfct_j\right) * 100\%$.[4] Clearly, this depends on the level of the domestic factor in question. If both β_2 and β_4 are positive (or negative), this implies that FDI has an unambiguously positive (or negative) effect on growth. In the first case, the factor in question enhances the positive effects of FDI on growth. However, if $\beta_2 < 0$ while $\beta_4 > 0$, this means increased flows of FDI have a deleterious effects on growth, but that this effect can be mitigated by the respective domestic factor. In this case increased levels of FDI promotes economic growth beyond a given threshold

[4]Given the linear regression model $lny_i = \beta_1 x_i + \varepsilon_i$, then $\frac{d(lny_i)}{dx_i} = \beta_1$. This is interpreted as: *the variable y changes by* $\left(e^{\beta_1} - 1\right) * 100\%$ *when x changes by one unit*

level of the respective factor.

2.4.2 Estimation Methodology - System GMM

The model in equation 2.1 however presents additional estimation problems – the presence of a lagged-dependent variable which gives rise to autocorrelation, the country specific effects may be correlated with the explanatory variables, and the explanatory variables may not be strictly exogenous – which cannot be handled using the OLS technique. To overcome these problems empirical growth researchers beginning in the mid-90s have turned to dynamic panel data models. In particular, researchers – among them Caselli et al. (1996), (Benhabib & Spiegel, 1997, 2000), Easterly & Levine (1997), and Levine et al. (2000) – employed first-differenced GMM estimation technique, a la Holtz-Eakin et al. (1988) and Arellano & Bond (1991), to estimate growth models.

First-differenced GMM estimation uses data averaged over five-year periods, reducing it to a few time periods and uses per capita GDP as the dependent variable to estimate the growth rate of per capital GDP. The model in Equation 2.1 can be written as:

$$\Delta y_{it} = \tilde{\alpha} y_{i,t-1} + x'_{it}\beta + u_{it}, \quad i = 1,...,N, t = 2,...,T \tag{2.3}$$

$$u_{it} = \mu_i + v_{it}$$

where $y_{it}$is the logarithm of real GDP of country i in period t, x_{it} is a vector of explanatory variables which include FDI flows, μ_i represent country specific effects (or fixed effects), and v_{it} is an idiosyncratic error term. Thus, the model 2.3 can be expressed as

$$y_{it} = \alpha y_{i,t-1} + x'_{it} + u_{it}, \quad i = 1,...,N, t = 2,...,T \tag{2.4}$$

Where $\alpha = \tilde{\alpha} + 1$, with all the standard assumptions[5] The estimation methodology follows

[5]The standard assumption state that: $E(\mu_i) = E(v_{it}) = E(\mu_i v_{it}) = 0, \forall i = 1,...,N, t = 2,...,T$, and that the transient errors are uncorrelated, i.e. $E(v_{is}v_{it}) = 0, \forall i, \& s \neq t$.

the difference GMM method, which involves taking the first differences of 2.4 to get rid of the country-specific effects, since these do not vary with time, this gives:

$$\Delta y_{it} = \alpha \Delta y_{i,t-1} + \Delta x'_{it}\beta + \Delta v_{it} \tag{2.5}$$

The transformed equation however poses some new estimation problems because the first lags of the explanatory variables in $\Delta y_{i,t-1}$ are potentially correlated with the $v_{i,t-1}$ in Δv_{it}. Moreover, any variables in the level equation that were not strictly exogenous may become endogenous after the transformation because the $x_{i,t-1}$ in Δx_{it} are also potentially correlated with $v_{i,t-1}$. This equation is estimated under the assumptions: first that there is no first-order serial correlation in the idiosyncratic errors, i.e. $E(v_{it}v_{i,t-1}) = 0$, and secondly that the initial conditions are predetermined, i.e. $E(y_{it}v_{it}) = 0$, $\forall i = 1,...,N, t = 2,...,T$. The estimation is carried out using lagged levels of the series as instruments for the equation in first differences.

The first-difference GMM estimator has several advantages over cross-country growth regressions. Foremost, it uses instrumental variables (IV) which allows the parameters to be consistently estimated, this also solves the problem of measurement errors in the right hand side variables. Secondly, it takes care of the omitted variable problem, thus resulting to unbiased parameter estimates. However, Arellano & Bover (1995) and Blundell & Bond (1998) noted that large finite sample bias can occur with the first-difference GMM estimator when the series are persistent, since this may lead to weak instruments. They show that the system GMM performs much better than the difference GMM in terms of finite sample bias and precision of the estimates. This has made the system GMM estimator the choice in most economic applications dealing with empirical growth analysis – as shown in the recent empirical literature on growth.

Several feature of country level panel data used in empirical growth analysis have been discussed with regards to the weak instrument problem associated with difference GMM. These include the fact that the time series are highly persistent with relatively short the time periods (due to the common practice of taking 5-year averages of the data). Bun & Windmeijer (2010) also

noted that the variance of the fixed-effects $\left(\sigma_{\mu}^{2}\right)$ is often expected to be high relative to that of the idiosyncratic shocks $\left(\sigma_{v}^{2}\right)$, and Soto et al. (2009) also remarked that the number of countries in most empirical growth studies is often very small. These features combined may lead to weak instruments, and thus lead to biased parameter estimates when using difference GMM . In particular, Bun & Windmeijer (2010) noted that the first-differenced estimator becomes weak when the autoregressive parameter approaches unity (i.e. when $\alpha \longrightarrow 1$), and when the variance of the country specific effects (i.e. $var(\mu_i) = \sigma_{\mu}^{2}$ becomes large relative to the variance of the idiosyncratic shocks σ_{v}^{2}.

The system GMM estimator of Blundell & Bond (1998) further exploits additional moment conditions on the initial condition that:

$$E(\mu_i \Delta y_{i2}) = 0 \tag{2.6}$$

This additional assumption about the initial condition remains informative even when the series are persistent – a common feature of country level growth data – and it is consistent with standard growth framework . Therefore using the system GMM, I estimate equations 2.4 and 2.5 using lagged first differences as instruments for 2.4 and lagged levels as instruments for 2.5. The constant term is dropped from all estimations because it drops off after differencing, and it is less informative in the model. Thus, all estimation results exclude the constant term.

2.5 The Data

This study uses a panel data of between 31 to 44 SSA countries for the period 1981-2010. Most of the data for this study comes from the World Bank's World Development Indicators (WDI) 2013, this includes per capita GDP and other explanatory variables to be discussed below. Data on FDI comes from the United Nations Commission on Trade and Development (UNCTAD) database. The study used current annual FDI flows in in current exchange rates as a percentage of GDP in all estimations. This is the standard measure of FDI used in the literature to investigate the

relationship between FDI and growth.

The data on human capital comes from the Barro-Lee measure of educational attainment.[6] This measure, viewed as the standard indicator of human capital development, has been used extensively in many studies of economic growth, among them Barro & Lee (2013), Borensztein et al. (1998), Barro (2001), and De la Fuente & Domenech (2001). The Barro-Lee measure of human capital is available in five yearly intervals from 1950 to 2010. I also used another version of the Barro-Lee data which is available from the Penn World Tables 2011.[7]

The data on institutions comes from the Political Risk Services (PRS) group's International County Risk Guide (ICRG). The ICRG data comprises of 22 variables divided into three categories of risk: political, financial, and economic risks. For the purpose of this research, I use three measures of political risk rating as indicators of institutional development. The three measure include (1) government stability, which assesses the government's ability to carry out its declared programs and to stay in office; (2) law and order, which assesses the strength and impartiality of the law (the law component) and the general observance of the law (the order component); and (3) corruption in government, which measures the level of corruption within the government. This data provides the closest measure of institutional development available and has been used extensively in the literature. The values of these indicators range between zero (0) and twelve (12) for government stability, and zero (0) and six (6) for corruption and law & order. Values close to zero indicate less government stability, higher levels of corruption and less law & order. However, for the purpose of this research, these measures are scaled to lie between 0 and 1, with values closer to 1 representing the best.

As a measure of infrastructural development, the study uses the number of telephones per 100 people, which also comes from the World Bank WDI. This does not represent a perfect measure of infrastructure especially given the evolution in communications systems in SSA with surge in cellphone usage within the last decade at the expense of landlines. However, aside from the fact

[6] Barro, Robert J and Lee, Jong Wha, "A new data set of educational attainment in the world, 1950–2010", Journal of development economics 104 (2013), pp. 184–198.

[7] Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 7.0, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, May 2011.

that cellphone subscription data is only available for a short period of time, the main problem is that it is not reliable as a measure of infrastructure. Other authors have also used the gross fixed capital formation (GFCF) as a measure of infrastructural development. The reasoning for this is that GFCF is investment tends to go out primarily for the purpose of improving a country's infrastructure.

It is always difficult to come up with a perfect measure of financial development, this is evident from the disagreements among scholars on what constitutes the 'right' measure of financial sector progress. This problem becomes even more difficult in cases of developing countries, and particularly for SSA, since only a handful of countries in this region have well organized and fully functioning financial markets. Thus, some of the conventional measures of financial development used for developed countries may not work for SSA countries. For the purpose of this research, I use the monetary aggregate, M2/GDP as a measure of financial development. M2 contains M1 and several other key monetary aggregates which are directly linked to a country's financial system, this makes M2 is a good indicator of financial sector development. Moreover, this indicator is one of the few that is readily available for a majority of countries in the sub-region. Other indicators of financial development used in this study include (1) a measure of the credit provided by the banking sector, and (2) a measure of the credit provided to the private sector, both as a percentage of GDP.

I use several other variables as control, among them the rate of inflation as a measure of macroeconomic stability, the initial level GDP as a measure of the catch-up effect (convergence), trade as a percentage of GDP as a measure of openness, and government spending, all of which are available at the World Bank WDI.The study uses annual data for the period 1981 – 2010 for all variables except the indicators of institutional development which start in 1984. I take five-year averages of the variables except for the Barro-Lee data on educational attainment which is only available in five-year intervals. The averages of the main variables of interest at the country level are given in Table A.6, and the overall summary statistics for the region are displayed in Table A.3.

2.6 Discussion of Results

The purpose of this study is to investigate the effects of selected host country factors on the relationship between FDI and growth in sub-Saharan African countries. In particular, the study investigates whether each of the four channels – financial development, human capital, institutions and infrastructure – do combine with FDI to promote growth in Sub-Sahara Africa.

Table A.4 on page 73 shows the results from a series of dynamic panel estimations of growth, each including an interaction term between FDI and the respective factor whose effects on the FDI-growth nexus this research sets out to investigate. All the models are estimated using the two-step system GMM method with no constant term. The dependent variable is the change in the log of per capita GDP and the main explanatory variables in Table A.4 are the lagged dependent variable, the initial level of GDP per capita, FDI as a percentage of GDP, one of the four factors, and an interaction term between the respective factor and FDI. The main parameters of interest are the estimated coefficients of FDI and the interaction term (β_2 & β_4 respectively).

2.6.1 Direct Effects on Growth

Foremost, the results in Table A.4 indicate that FDI promotes growth (i.e.$\beta_2 > 0$ and significant) in per capita GDP in all but two specifications – columns 6 & 8 where FDI has a negative but insignificant effect on growth. These results, in contrast with Borensztein et al (1998), indicate that FDI promotes growth in SSA. However, the results for some columns 2, 5, and 7 are not robust to the introduction of the Windmeijer corrected standard errors, see Table A.5. The results in Table A.4 also indicate that human capital, institutions and infrastructure all have a positive and significant effect growth in SSA, with institutions having the greatest impact on growth. However, for two of the indicators – M2 and CRBKNG – financial development negatively affects growth in these countries.

2.6.2 Effects of Interaction Terms on Growth

Financial Sector Development

This study use three indicators of financial development – the money supply (M2), credit provided by the banking sector (CRBKNG), and credit provided to the private sector (CRPRVT) – all measured as a percentage of GDP. These results for these three indicators, are shown in Columns (1), (2) and (3) of Table A.4. These results show that two of these indicators, M2 and CRBKNG, have a positive and significant effects (i.e.$\beta_4 > 0$) on the FDI-growth relationship. The implication is that financial sector development, as measured by these indicators, do enhance the effects of FDI on economic growth in SSA. The third indicator of financial development, i.e. CRPRVT, has a negative but insignificant effect on the FDI-growth relationship.

Consider the first column of Table A.4 for M2, the coefficient of FDI is $\beta_2 = 0.0213$ and the coefficient of the interaction term is $\beta_4 = 0.0004$, both significant at the 1% level. This implies that an increase in FDI flows by one percentage point of GDP improves growth in per capita income by $(\beta_2 + \beta_4 dfct) \star 100$. From the summary statistics, we have the average level of M2 = 28.09% of GDP (see Table A.3). Thus, an increase in FDI by one percentage point of GDP increases per capita GDP growth by an average of 3.3% . Similarly for column 2, the parameter estimates for β_2 and β_2 are respectively 0.0172 and 0.0002, and given the average value of CRBKNG as 30.2396% of GDP, an increase in FDI by 1% of GDP improves per capita GDP growth by 2.3%. Thus on average, M2 and CRBKNG boosts per capita GDP growth by 3.3% and 2.3% respectively. This suggests that financial development enhances the effect of FDI on growth in Sub-Saharan Africa. This findings are consistent with Durham (2004) and Alfaro et al. (2010), who also find that financial sector development promotes the effects of FDI on growth. The results are shown to be robust. However, the magnitude of the effects vary across individual countries, as the averages differ by country as shown in Table A.6.

Institutional Development

The results in Table A.4 also show that an improvement in institutions, measured by government stability (GOVSTAB) and the level of government corruption (CORRUP) has a significantly positive impact on the relationship between FDI and growth. The estimates of the interaction terms are respectively 0.0303 and 0.1011 both significant at the 1% level. For the third indicator of institutional development, law and order (LAWODR), the interaction term is negative but insignificant. These results, shown in Columns (6) – (8), further reaffirm the findings by Durham (2004) that institutions play a positive in the FDI-growth nexus. However, in the model containing institutions, the direct effect of FDI on growth is shown to be negative but insignificant for two of the indicators. One very important point about these results, as indicated by the coefficients of the interaction terms, is that institutions have a greater positive impact on the FDI-growth nexus than the other host country factors examined in this study. This further emphasizes the important role of institutional development, and thus implies that FDI has a greater impact on growth in countries with better institutions. However, the law and order component is shown to have a significantly negative effect on the FDI-growth relationship. This results ceases to be significant when the Windmeijer correction is used.

Human Capital Development

The most surprising result in this study relates to the role of human capital on the FDI-growth relationship. Contrary to Borensztein et al. (1998), this study finds that human capital negatively affects the relationship between FDI and growth in SSA. The implication of these results, shown in columns 4 & 5 is that improvements in human capital, measured by the Barro-Lee measure of educational attainment, have a negative effect on the relationship between FDI and growth in SSA. From Column 5, we have $\beta_2 = 0.0850$ and $\beta_4 = -0.0334$, this shows that the effect of FDI on growth is positive but declining for values of human capital development up to $HCAP = 2.5449$, the effects of FDI on growth will be zero at this level of human capital. Above this level of human capital FDI begins to have a negative effect on FDI. However, data on human capital development

for SSA indicate an average level of human capital development well below the 2.5449 threshold, and the maximum level of human capital development in the region is 3.19 years. Thus, the while this may depress growth in the region, The region hasn't reach the point where more FDI flows could result to negative growth. However the situation may be different for individual countries as shown by Table A.6.

Infrastructural Development

As in the case of human capital, both indicators of infrastructural development – gross fixed capital formation (GFCF) and the number of telephones per 100 people (TELE) are shown to negatively impact the relationship between FDI and growth in the region. These results are shown in Columns 9 and 10 of A.4 In the case of infrastructural development, the results for the number of telephones per 100 people (TELE) in Column 10 gives $\beta_2 = 0.0335$ and $\beta_4 = -0.0017$. The results imply that improving the level of infrastructure, measured by $TELE = \frac{number\ of\ telephone\ lines}{100\ people}$ depresses the effect of FDI on growth up the point where $TELE = 20$. Another measure of infrastructure used is the gross fixed capital formation as a percentage of GDP, the results for this indicator are shown in Column 9 of Table, however this indicator fails to be insignificant when subjected to further robustness test.

The overall conclusion from the investigation is that institutions and financial development enhance to effects of FDI on growth in sub-Saharan Africa. For human capital development, the results show a negative effect, however further investigation shows that this negative effect is not being currently being realized in SSA. The same is true for infrastructure, as measured by the number of telephones per hundred people. Thus overall Domestic factors have a net positive impact on the effects of FDI on growth in SSA.

2.6.3 Robustness Checks

As a first step toward testing the robustness of the results in Table A.4, each model is tested for the validity of instruments using the Hansen test of over-identifying restrictions. The results show

the absence of any over-identifying restrictions, thus the instruments are valid in all the models estimated. The p-values of the test statistics are reported in Table A.4. I also performed the Arellano-Bond test for the first and second order serial correlation, and the results of these tests indicate the absence of first and second order serial correlation in all the models. The first order serial correlation is also absent in all models except for those in columns (9) and (10), for infrastructure. Unlike the estimated asymptotic standard errors of the one-step GMM estimator which are virtually unbiased, those of the two-step GMM have been shown to be severely downward biased in small samples . Windmeijer (2005) points out that this downward bias results from the use of initial consistent parameter estimates in the weight matrix used in calculating the efficient two-step GMM estimator. This downward bias in the asymptotic standard errors may lead to a type II error. Windmeijer (2005) developed a correction for this bias, known as the Windmeijer Correction (WC). I therefore use this correction to evaluate the precision of the two-step estimates in Table (A.4). The results of the corrected standard errors are shown on Table A.5. These results are not significantly different from those of the original results as most of the variables of interest continue to be highly significant. However, one notable difference is that interaction term between FDI and M2 remains positive but insignificant. Overall, the estimates are shown to be robust and precise. It has been shown from past studies of growth that many factors – macroeconomic, political and social – exist besides those included in Tables (A.4) that may affect the economic growth in developing countries, see for example Easterly & Levine (1997). I therefore test the sensitivity of the parameter estimates to the inclusion of other factors known to affect growth in SSA. Specifically, I test for the robustness of the results to openness (measured by the volume of trade, i.e. imports and exports as a percentage of GDP), government consumption, savings, inflation, size of the population, foreign aid, and other measures of political stability and institutional development. The results of the robustness tests for one indicator of financial development (CRBKNG) are shown in Table (A.8), and those of two indicators of institutional development (GOVSTAB and CORRUP) are shown in Tables (A.7) and (A.9) respectively. The Windmeijer corrected standard errors are used in all the estimations. As these results show, these indicators are robust – i.e. they continue to

be positive and significant – to several of these additional determinants of growth.

2.7 Conclusions

Studies have shown that FDI does not have an unmitigated effect on growth Borensztein et al. (1998), Durham (2004). This study tests this hypothesis in the context of the Sub-Saharan African region, by answering the specific the question "how does FDI promote growth in SSA?" In answering this question, this study examines four host country factors – human capital, institutions, infrastructure and financial development - which have been shown have a direct positive effect on growth. This study investigates whether these factors enhance the effects of FDI on growth in the region. As with other studies on this issue, this study fails to find strong evidence to support the hypothesis that FDI has a direct unmitigated positive effect on growth in SSA, as the findings remain mixed. This should not be interpreted however as an indictment on FDI flows.

The findings on the impact of the domestic factors also prove to be mixed with two factors (financial sector development and institutions) shown to positively affect the FDI-growth relationship while the other two (human capital and infrastructure) have the opposite effect on this relationship. In line with Durham (2004) on financial development and institutions, and Alfaro et al. (2010) on financial markets, the results show that developments in both the financial sector and in institutions have a positive impact on the relationship between FDI and growth in SSA.

However, unlike Borensztein et al. (1998), this study finds that human capital has a deters the impact of FDI on growth. The results show a negative and significant effect of the interaction term between FDI and human capital in the growth regressions. This finding contrasts with Borensztein et al. (1998) who finds that FDI promotes growth beyond a given threshold of human capital. It is worthy to point out that, this study differs from Borensztein et al. (1998) in terms of the composition of the sample of countries, the period covered, the type of FDI data used and estimation methodology employed. It is not clear whether these differences played a role in the differences between the results.

Possible explanations for the results on human capital development include (1) the effect of brain drain, (2) a structural mis-match between available skills and labor requirements of foreign investors, and (3) a combination of the two. While the SSA region is a long way from catching up with the developed world in terms of human capital development as measured by educational attainment, countries in the region have clearly made progress in their efforts to improve their human capital capacity. It therefore sounds counterintuitive that improvements in human capital negatively affects the FDI-growth relationship. One possible explanation is the problem of brain drain which continue to cancel out these efforts as many skilled workers leave the region for economic and in some cases political reason, leaving the countries short of the much needed human capital needed to complement foreign investments in the region. A second, and may be more plausible explanation relates to the mis-match between available skills and the skill set required by foreign investors. On one side of this problem is the fact that a significant proportion of foreign investment into SSA go into highly capital intensive and highly technical investment projects that not only hire less labor but also require specific kind of labor and/or training, and the only recourse is to train domestic labor or bring in foreign expatriates. On the other hand, a good number foreign investors bring in their own labor and only hire domestic workers in unskilled positions. This is not to say that foreign investors do not hire or train local labor, although foreign investors do create employment in host countries in SSA, this does not invalidate the reality of the mis-match described above which may be partly responsible for the results on human capital development. Thirdly, it could be a combination of both as the effects of brain drain could eventually leads to the mis-match described. The good news however is that, the negative impact of human capital is not currently been felt in the region. This is because, as further analysis show that the current average level of human capital for the region (measured by the Barro-Lee educational attainment) is below the threshold above which the negative effects could kick in. The situation however could be different for individual countries.

Another fascinating finding is infrastructure also has a negative impact on the FDI-growth nexus. The results show that the interaction term between FDI and infrastructure also has a sig-

nificantly negative effect on growth. Clearly, infrastructure in most sub-Saharan African countries remains relatively poor compared to other regions, and this is one area that SSA countries definitely needs to improve. Gross fixed capital formation is believed to be the vehicle through which countries develop their infrastructure, but this spending has been relatively small in the region compared to other regions. Again as in the case of human capital, the current average level level of infrastructural development is well below the level beyond which the negative effects on the FDI-growth nexus could kick in. Infrastructural development has also been identified as one of the key determinants of FDI flows abroad particularly tangible infrastructure like electricity generation, transportation and communications.

To conclude, given their rich natural resources and huge growth potentials, SSA countries can not only attract quality foreign investments but could be realize increased growth from these investment if the countries continue to strengthen their institutions and financial sectors, while developing their infrastructure. At the same time, these countries should continue to develop their human capital to meet the needs of 21st century jobs and motivate workers to stay in their countries. It should be noted that there are a few countries in the region that rank way ahead of the rest with respect to the issues discussed above, and some of these countries are even attracting human capital from other countries in the region. This study gives a broad, but specific insight into how host countries could influence the effects of FDI on growth in SSA. This represents only a first step into examining what is clearly a complex issue. Future studies should examine this issue on a narrower regional basis or by country case studies.

Chapter 3

Investigating the Effects of Foreign Direct Investment on Economic Welfare in Sub-Saharan Africa - A Quantile Regression Approach

3.1 Introduction

The importance of foreign direct investment to sub-Saharan African countries cannot be over-emphasized. This is reflected in the interest the topic has generated in the Development Economics literature particularly in the last two decades. Studies on the topic of FDI have examined a varying number of questions on the activities of multinational companies (MNCs) in developing countries and the effects these activities have on host country economies. However, one area that has received relatively little attention relates to the impact of FDI flows on economic welfare in host countries. Specifically, questions dealing with the effects of FDI flows to developing countries on economic welfare have not been adequately addressed. This question proves important because one of the primary reasons developing countries seek foreign investments is to advance their growth and

development, and the level of economic well being represents arguably the best measure of a country's level of economic development. Thus, understanding how foreign investments affect welfare in host countries proves important not only to researchers in development issues but also to policy makers in these countries and their development partners.

Few studies to have attempted to investigate the effects of foreign investments and welfare, among them: Bhagwati et al. (1987) on Japanese FDI to the United States; Blalock & Gertler (2008) on the activities of multinational companies (MNCs) in Indonesian firms; and Balcao Reis (2001, 2006) on the impact of the activities of foreign investors on developing-country economies. Other studies on this topic include Fumagalli (2003), Miyagiwa & Creane (2009) and Mukherjee & Suetrong (2009). However, most of these studies are either very general or they address the issue in relation to a specific country, with none addressing the issue specifically for the SSA region.

Although many SSA countries have made gains in areas like economic growth, democracy, and human rights in the last decade, most countries in the region still rank among the least in the world in several development indicators. The 2013 Millennium Development Goals (MDG) Report for example shows that among the goals this study considers most directly related to economic well being,[1] SSA is not only below the developing country average, but the region has made the least progress relative to other developing regions, thus leaving it way short of the targeted bench marks with less than a year from the target date. According to the report, the under-five mortality rate in the region is more than 16 times the average for developed countries. Also, the 2013 United Nations Human Development Report for example, shows that about 75% of SSA countries have a low Human Development Index (HDI), in addition these countries make up about 82% of all countries in the low HDI range. Most of these development metrics have a direct link to economic welfare in these countries. This makes understanding the welfare effects of FDI an important issue for the SSA region.

[1] Of the eight MDGs, this study considers four of these to be the goals most directly related to economic well being: Goal 1: Eradicating extreme poverty and hunger; Goal 4: Reducing child mortality; Goal 5: Improving maternal health and Goal 6: Combating HIV/AIDS, malaria and other diseases. In all four of these goals, SSA is not even close to attaining the levels of other regions prior to 1990 when these goals were set. See The Millennium Development Goals Report 2013

Some studies, like Balcao Reis (2001, 2006) use growth as a proxy for welfare in their analysis, while others focus on growth with a tacit assumption that improved growth lead to a better overall welfare in developing countries. However, although growth remains one of the most important economic indicators, this study argues that it represents a flawed measure of welfare, for the same reasons that a country's national accounts do not reflect an accurate measure of the welfare of its people. First, as in the case of national accounts, growth includes activities that have no direct positive impact on economic welfare - e.g. military spending, and others that have a negative impact on welfare - e.g. environmental damage. On the other hand, many subsistence activities and other non-market activities that have proven to have a positive impact on economic welfare, particularly in the rural areas, are often either completely left out or not accurately accounted for in growth. This proves to be the case in many areas of SSA due in part to the existence of large informal sectors, coupled with relatively weak national accounting systems. Lastly, even when it is shown to be a representative measure of a economy's welfare, we cannot conclude that higher growth improves welfare, because as Amartya Sen puts it, the economy is not an individual. Thus, just because GDP increases does not imply a general improvement in a country's welfare.

On this note, this study uses data on final household consumption, a more accurate, more focused and most widely acceptable measure of economic welfare, to investigate the impact of FDI on welfare in SSA. Moreover, given the high degree of economic inequality in the region, which often result to a grossly inequitable distribution of economic fortunes, this study examines this question at different levels of welfare. The question addressed in this study can be broken down into two, the first which asks "*Does FDI promote economic welfare in SSA?*" is more broad and general relates to the impact of FDI on economic welfare on the region. The second question, "*To what extent does this effect depend on the level of welfare already attained by an individual?*", drives deeper into the issue to further investigate the effects of FDI at different levels of economic welfare. Answer to these questions provide information regarding the qualitative impact of FDI in the region. As these countries continue to pursue policies to attract increasing levels of foreign investments, it remains equally important to understand how these investment inflows impact the

host residents, and the policies needed to maximize the benefits from these investments.

The rest of this chapter is organized as follows: the remainder of this section discusses the motivation and states the hypothesis of the study. Section 3.2 reviews the literature on studies investigating the effects of foreign investment on welfare. Section 3.2 discusses issues related to welfare measurement and a review of some historical measures of welfare. Section 3.3 explains the model and econometric methodology used. I will briefly discuss the quantile regression methodology and why I use it to answer the questions posed in this study. I will discuss the data used and their sources in Section 3.4 before discussing the estimation results in Section 3.5 and Section 3.6 concludes.

Purpose and Motivation of Study

The primary purpose of this study is to highlight the role of FDI in SSA by examining its contribution to economic development through its impact on welfare in the region. Attaining sustainable growth and development remains one of the most important goals of SSA countries as they continue to put in place policies and programs designed to achieve these goals. Foreign capital flows to the region in the form of private foreign investment (FDI) coupled with development assistance continue to be considered as the main vehicles through which these objectives could be achieved.

Although the literature on the contribution of these foreign capital flows - in particular foreign direct investment - on economic growth is vast, few studies have attempted investigate their effectiveness in promoting development in SSA countries. As the literature review shows, research on the relationship between foreign direct investment and economic welfare is relatively scant. Two things particularly standout regarding this literature: first, no clear definition of welfare is put forward in these studies. This proves important because clearly defining a measure of welfare provides an objective means of evaluating the how it is impacted by policies and programs pursued by developing countries. Secondly, none of the studies reviewed address the issue in relation to the SSA region. This study therefore focuses this investigation specifically on SSA.

This is important for two main reasons: first, improvements in welfare represents a signifi-

cant element in economic development, and understanding the role of foreign investment in this issue proves crucial for developing countries in general. Secondly, Sub-Saharan African countries have unique developmental challenges that could be best understood and addressed by treating these countries differently. Although, studies of developing countries in general do provide broad ranging information regarding the development problems these countries face, in most cases the results do not accurately reflect (or address) the prevailing economic conditions in the respective countries, often from different regions.

The Hypothesis

This study tests the hypothesis that, "*an increase foreign direct investment flows improves economic welfare in SSA*". I test this hypothesis by examining the impact of foreign investment flows at different levels of welfare across the conditional distribution of welfare in the region. Considering that this relates to a fundamental development issue facing the region, the success of any development program should be measured by its contribution in improving the economic well being of those at the bottom. This test proves important because countries in the region rely almost entirely on external finance in the form of FDI for their much-needed investments, thus understanding the implications of FDI flows for economic development through its effects on welfare proves crucial for SSA countries. The results to this test provide and answer to the central research question in this study, that is "Does foreign direct investment flow improve economic welfare in Sub-Saharan African countries?"

3.2 Literature on the Relationship between FDI and Welfare

The literature on the nexus between FDI and welfare is scant with only a handful of papers, among them (Balcao Reis, 2001, 2006), Bhagwati et al. (1987) , Blalock & Gertler (2008) and a few others. Most of the literature reviewed below is based on theoretical models developed to explain the effects of FDI on welfare. Only one empirical study was found on the subject, and this focus

on manufacturing firms in Indonesia. No study exist on this issue that focuses on SSA countries.

Balcao Reis (2001)constructed a model of FDI and welfare which shows that FDI has a negative effect on welfare through its crowding-out effect on domestic investment. The model shows further in a second paper,Balcao Reis (2006) that this negative effect persists even when the host country follows an optimal tax policy. Balcao Reis (2001) and Balcao Reis (2006) conclude that the creative destruction activities of FDI, which gives rise to the displacement of domestic investors by their foreign counterparts, results to a reduction in economic welfare. The displacement of domestic investors, the author claims, results to the loss of jobs created by local firms and these jobs do not get replaced by foreign investors. Reis (2001) argues further that the takeover by foreign investors results to a transfer of profits to foreign firms which get expatriated abroad, thereby resulting to a further loss of welfare in the host country. In Balcao Reis (2006), the author shows that foreign investment decreases welfare in the host country even when the country adopts an optimal tax policy. She concludes that the positive spillovers from FDI – the decrease in the cost of introducing new good in the host country – remain underwhelming compared to costs to the host country. However, the argument that FDI crowds-out domestic investor runs counter to Borensztein et al. (1998) who concludes that FDI complements domestic investment through the transfer of technology, they however warned that this effect is less robust.

The findings by **?** and Balcao Reis (2006) also stand in stark contrast toBlalock & Gertler (2008) who conclude that FDI improves welfare in host countries through increased competition and lower prices. Blalock & Gertler (2008) hypothesize that multinational companies transfer technology to local firms in emerging markets, and that these technology transfer motivate entry and competition, hence increased output and lower prices. They test this hypothesis using a panel data of Indonesian manufacturing firms and find "strong evidence" that foreign direct investment leads to productivity gains, greater competition, and lower prices. This, they conclude, leads to overall welfare improvement for the host country, adding that FDI is Pareto improving and that government policy in host countries should encourage more FDI flows. this study is however based only on Indonesian firms and the finding may have limited if any implications for other

developing countries. In another study focusing on Japanese FDI in the United States, Bhagwati et al. (1987) introduced the idea of a quid pro quo foreign investment (i.e. FDI in exchange for the easing of restrictions on trade) in describing Japanese foreign investment in the United States. The investment takes place in two stages: in the first stage the Japanese government encourages the flow of FDI from Japan to the United States as a way of buying goodwill and to defuse any threats of trade protection against Japanese goods. This is done by co-opting pressure groups in the United States, i.e. the firms and labor unions that may stand to lose a share of the market and jobs respectively that may result from imports from Japan. Thus the first stage serves to build ties through foreign-domestic partnerships that serve to benefit both sides while at the same time creating jobs, hence improving welfare.

Using a simple open-economy mixed oligopoly model,Mukherjee & Suetrong (2009) show that a two-way causality exists between privatization and green field FDI. A situation where privatization incentivizes foreign investors and hence increases FDI flows into the privatizing country. The increased FDI in turn encourages host countries to further privatize, unlike countries with no FDI inflows. Mukherjee & Suetrong (2009) argues for reforms allowing FDI and reducing state ownership serve to increase welfare, adding that the host-country should adopt a strategy of partial privatization – i.e. neither complete privatization nor complete nationalization – in order to maximize welfare in the presence of foreign competition. While acknowledging that privatization decreases the contribution of local firms to output, they authors countered that the increase in output of foreign firms offsets this, thereby leading to welfare improvements for the host country.

In another study on the relationship between FDI and welfare, Fumagalli (2003) investigates the welfare effects of subsidy competition for foreign direct investment. The paper argues that "competition for FDI might play a positive role by facilitating efficiency-enhancing location decisions" that would otherwise not occur in the absence of such subsidies. The paper concludes that subsidies play a role in influencing the location decisions of multinational companies (MNC) and hence on their welfare effects. When countries offer subsidies to MNCs, this motivates them to locate in countries in which they would otherwise not invest. Under the assumption that MNC's

export to a country in the absence of incentives, the paper concludes that the welfare effects of FDI changes dramatically. However, SSA countries could find it difficult to thrive in such an atmosphere as most SSA countries are not only underdeveloped but lack the resources to effectively compete for FDI. Most SSA countries have over the years offered incentive packages to attract foreign investors but the region continue to be relatively out-muscled by their counterparts in the competition for FDI. Thus, it will take more than just incentives for the SSA region to attract the kind of FDI that would promote welfare in these countries.

However, to the best of my knowledge, there is no study focusing on the welfare effects of FDI exclusively in SSA countries, and given the strategic nature of FDI to the region it is important that this issue be examined with a view to providing an insight into the nexus of the relationship between FDI and welfare in the region.

Welfare Measurement

The question of what represents the correct indicator of a society's welfare has been at the core in many development studies. Answers to this question have been the subject of disagreement among scholars since the 1950s, and the question continue to be relevant in studies of economic development. Measuring welfare correctly not only improves the accuracy of studies on the subject, but it also help policy makers implement the right policies to improve the welfare of their people. This section discusses some of the issues related to the measurement of welfare with a brief discussion of the history and evolution of measures of economic welfare to analyze their utility for modern SSA.

Before the 1970s, economic welfare was measured primarily using a country's GDP based on the system of national accounts (SNA), and researchers emphasized the level of per capita GDP and the GDP growth rate as important indicators of economic welfare. However, by the late 1960s scholars began questioning the accuracy of these measures, and by the early 1970s it was becoming clear that measures of welfare based on the system of national accounts were crude indicators of welfare. In his argument against the use of GDP based measures as indicators of welfare, Amartya

Sen states that it is impossible to conclude that higher levels of GDP result in higher welfare because the nation is not a single person, while Mishan (1960) on the other hand focused his arguments on the costs of attaining higher levels of GDP. Offer (2000) also contends that the system of national accounts (SNA) developed by the United Nations is not meant to monitor welfare but rather to provide an efficient measure of changes in the business cycle. Thus, as the arguments against using GDP as a measure of welfare intensified towards the end of the 1960s many experts sought out alternatives to GDP as an indicator of welfare.

The first alternative measures of welfare, called the system of extended accounts, were computed by adding imputed values of sources of welfare not captured by GDP and deducting the values of activities that either do not add to welfare or that negatively affect welfare. This practice results from the observation that non-market activities contribute to welfare.

Among the early measure of welfare introduced as an alternative to the GDP was the Measure of Economic Welfare (MEW) developed by Nordhaus & Tobin (1972). These authors noted that GDP serves as a crude indicator of welfare because it leaves out important elements that contribute to improving the economic welfare of a country. They added that the GDP overstates the value of output since it fails to adjust for negative externalities from production activities. Thus, to arrive at a more accurate measure of welfare, Nordhaus & Tobin (1972) adjust the GDP by including an imputed value for leisure and the amount of unpaid work (or the underground economy), and then deduct the value of environmental damage from economic activities, thus arriving at the MEW. The MEW was followed by the work of Zolotas (1981) who introduced an index called the Economic Aspects of Welfare (EAW). This index made further adjustments to the GDP by accounting for pollution, the depletion of non-renewable natural resources, and an imputed cost for some social damages. Zolotas argued further that economic growth may cease to promote welfare beyond a certain point. Following the EAW was the Index of Sustainable Economic Welfare (ISEW) developed by (Daly & Cobb, 1989), a further extension of Zolotas' EAW. The ISEW further adjusted the EAW by taking into account the negative externalities of economic growth and income inequality, it also subtracts the value of defense expenditure from GDP. Another indicator of welfare was

the Genuine Progress Indicator (GPI) introduced by Cobb et al. (1995), this was a further refinement of the ISEW which accounts for other social and environmental effects of both economic and non-economic activities.

Although each of the indicators just discussed represents an improvement over GDP as an indicator of welfare, they all however use the GDP as a basis of their calculations, which itself as already mentioned is a flawed measure of economic welfare. Most of these measures have the additional disadvantage that they are only available mostly for developed countries. This makes conducting welfare studies of developing countries using these indicator proves an almost impossible task.

Although most of the discussions on the indicators of welfare have focused on alternative measurements which as we see are derived from adjustments of a country's GDP, others have looked at the social indicators of welfare – for example education, housing, health and life expectancy, environmental quality, crime, poverty and nutrition - as important elements in determining a society's welfare. The United Nations Human Development Index (HDI) – a composite measure of life expectancy, educational attainment and income – has emerged as an important indicator of a society's welfare. The HDI, which was introduced in 1990 by Mahbub ul Haq (a Pakistani) and Amartya Sen (an Indian), lies between zero (0) and one (1) with increasing values indicating higher levels of welfare for a country. It has since become a tool for comparing countries in terms of overall development and welfare improvement. Countries with a HDI of 0.800 or higher lie on the very high end on the human development spectrum while countries with a HDI below 0.500 belong to the low end human development spectrum. According to the 2013 Human Development Report, 75% of SSA countries lie in this range, and of the countries in the low human development range, 82% are from SSA. One of the advantages of the HDI over the extended accounts measures and other social indicators of welfare is that it is readily available for almost all countries. The HDI also represent an improvement (over GDP alone) as an indicator of overall welfare because it incorporates other elements related to individual well-being.

Welfare and Consumption

Clearly the the indicators discussed above represent an improvement over GDP alone in terms of welfare measurement, but scholars continue to search for better and more representative indicators of welfare. Thus, the debate over what constitutes an appropriate measure of welfare has shifted from choosing among different extended accounts measures to choosing between income-based and consumption-based measures of welfare. Measures of consumption obtained from household surveys have emerged as better quantitative indicators and regarded as the most objective measures of welfare relative to income-based measures. [2]This derives from the view that levels of consumption relate more closely to an individual's well-being than income, which constitutes only one element in achieving an individual's consumption needs. This holds particularly true in the case of sub-Saharan African countries where a large proportion of the population live on subsistence activities. Another advantage of consumption over income as an indicator of welfare relates to how the two are measured. According to the World Bank, consumption may be more accurately measured than income, particularly in the "poor agrarian economies and in urban economies with large informal sectors", and it may indicate a better reflection of a household's ability to meet its basic needs. One of the main criticisms about using income as a measure of welfare relates to the notion that income varies greatly over time relative to consumption. Unlike income, consumption exhibits a relatively smooth pattern over time. This holds particularly true in rural SSA where income levels fluctuate highly during the course of the year – as farmers' incomes are often very low during the cultivation seasons and high during the harvest season – but consumption levels remain relatively stable over time.

No universally perfect measure of welfare exists, and what constitutes a good measure of welfare depends on other factors among them the development status of a country. Income for example could be a better welfare indicator for industrialized countries where self-employment is relatively

[2]The Living Standards Measurement Surveys (LSMS), inspired by the World Bank as a tool for measuring poverty has emerged as one of the most widely referenced surveys for information welfare. The questionnaire for the survey is designed to improved the type and quality of household data for the purpose of obtaining information on poverty related issues.

rare so that most household income comes from a few formal sources where incomes are well documented. Consumption on the other hand is a more suitable indicator of welfare for developing countries. Moreover, a society's welfare depends on many factors, for example economic, political, social, environmental, psychological and physical, many of which cannot be measured quantitatively. Thus, any indicator of a society's welfare may be fraught with difficulties and can be only as good as the factor(s) used in measuring it.

According to economic theory welfare is a function of the level of consumption, economic theory also assumes consumers to be rational economic agents who choose a combination of consumption (of goods and services) to maximize their welfare (or utility). Thus standard economic theory states that utility depends on consumption, i.e. $U = U(C)$, and that utility increases monotonically with consumption, i.e. $U'(C) > 0$. Thus an increase in the level of consumption increases the level of welfare/utility.

The measure of consumption used in this study comes from the World Bank's World Development Indicators (WDI) 2013. The World Bank defines household final consumption expenditure as "the market value of all goods and services, including durable products (such as cars, washing machines, and home computers), purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses. Thus, the final household consumption expenditure contains most of the elements that contribute to an individuals welfare.

3.3 Econometric Model and Estimation Methodology

3.3.1 The Econometric Model

The purpose of this study is to determine the effects of foreign direct investment on economic welfare in sub-Saharan Africa. This study addresses this issue by answering the question "does increased FDI flows improve welfare in SSA countries?" To answer this question, this study assumes welfare to have an expected value that is a linear function of FDI flows, income, and

other explanatory variables thus the econometric model:

$$wel_{it} = \beta_0 + \beta_1 fdi_{it} + \mathbf{w}'_{\mathbf{it}}\boldsymbol{\beta}_{\mathbf{2}} + u_{it} \tag{3.1}$$

Where, wel_{it} represents a measure of the welfare of country i in period t, fdi_{it} is the per capita foreign direct investment flow to country i in period t, and $\mathbf{w}'_{it}$ is a vector of other explanatory variables. β_0 and $\beta_1$are the constant term and parameter of fdi_{it} respectively, and $\beta_2$is a vector of coefficients of the other explanatory variables. Equation 3.1 is first estimated using OLS and the results are shown in columns 1 and 2 of Table A.13. These estimates are compared with those obtained from the quantile regression method described below.

3.3.2 Estimation Methodology

From examination of the quantile plot of the welfare distribution in for SSA during the period 1990-2011 (Figure A.6), welfare is shown to have a highly skewed distribution, with welfare increasing slowly at first as we move up along the quantiles up to the $80th$ quantile. The plot shows higher levels of welfare at the higher quantiles, with the top 5% of the distribution enjoying a disproportionately high level of welfare. With this type of distribution of the dependent variable, OLS (mean regression) is unlikely to produce an truly representative estimate of the effects of FDI flows on economic welfare at different point alon the welfare distribution. Quantile regression proves to be the most suitable estimation technique to produce the full range of the effects of FDI flows at different welfare quantiles. Moreover, the presence of heteroskedasticity in the data[3] could lead to wrong standard errors, which may not be corrected even with robust standard errors when using mean regression. By providing a comprehensive analysis of the effects of FDI on economic well being in SSA, QR provides a richer understanding of this relationship. Thus, to fully explore the relationship between FDI and welfare in the region, this study uses the quantile regression (QR) estimation technique to investigate the effects of foreign investments on welfare in SSA. This first

[3]The results of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity rejects the null hypothesis of a constant variance, see Table A.11 in the Appendix

part of this section discusses the intuition behind the quantile regression estimation technique, followed by a description of its application in estimating the model in Equation 3.1.

Applications of quantile regression methods in economics have been relatively few but rapidly expanding within the last two decades. These applications have mostly been on studies dealing with labor market and other related topics. Some of the most notable papers using quantile regression in economics include Chamberlain (1994), Buchinsky (1995) and Angrist et al. (2006) all of which have applications to the US wage structure. One application to FDI relates to the work of Girma & Görg (2005), who examine role of absorptive capacity in determining the benefit to UK domestic establishment, from productivity spillovers resulting from FDI.

3.3.2.1 The Quantile Regression Model

Consider a linear regression model $y_i = x_i\beta + u_i$, with ordinary least squares (OLS) regression, we summarize the average effects of the independent variable x on the dependent variable y based on the conditional mean function $E(y|x)$. This provides a partial relationship between the two variables, i.e. the expected change in y given a unit change in x. Quantile regression on the other hand provides information on the relationship between the two variables across the whole conditional distribution of the dependent variable y. The quantile τ, $\tau \in (0,1)$ is the value of y that divides the data into proportions τ below and $1-\tau$ above when the values of y are arranged in an array. Some notable advantages of quantile regression (QR) over least squares regression include the following[4]: QR is more robust to outliers than OLS regression and is best suited to analyze heteroscedastic data; it is invariant to monotonic transformations i.e. $Q_Y\{f(y)\} = f\{Q_Y(y)\}$ unlike the mean regression where it is not necessarily the case that $E\{f(y)\} \neq f\{E(y)\}$; lastly and maybe most important QR permits us to study the impact of the regressor, x on the location and scale parameters of the model, which not only provides a richer understanding of the data, but also a more comprehensive analysis of the relationship between the variables of interest.

[4]See Cameron & Trivedi (2009) page 211

The Intuition behind Quantile Regression[5]

Let Y be a random variable with cumulative distribution function (cdf) given by

$$F_Y(y) = P(Y \leq y) \tag{3.2}$$

For any $\tau \in (0,1)$, the τth quantile of Y is given by

$$Q_Y(\tau) = F^{-1}(\tau) = inf\{y : F(y) \geq \tau\} \tag{3.3}$$

When $\tau = 0.5$, $F_Y^{-1}(0.5)$ yields the median of the distribution. For example, given a random variable Y with distribution function F, the τth quantile of this random variable is obtained by solving for z the expression

$$Q_Y(\tau) = \underset{z}{argmin} \sum_{i=1}^{N} \rho_\tau(Y_i - z) \tag{3.4}$$

Where ρ_τ is a loss function defined as $\rho_\tau(u) = u\left(\tau - 1_{(u<0)}\right)$, a piecewise linear function that is based on the absolute error $|Y_i - z|$. This function is illustrated in Figure 3.1.

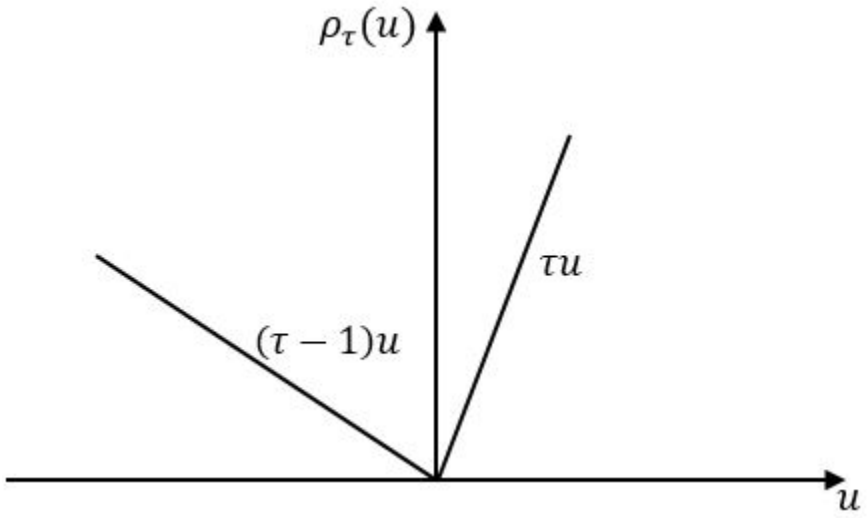

Figure 3.1: Asymmetric Loss Function

[5]This section is adapted from Koenker(2001, 2005): Quantile Regression, Econometric Society Monographs no. 38, Chapter 1

If e_i denote the model's prediction error, OLS (i.e. mean regression) minimizes the sum of squared errors (i.e. $\sum_i e_i^2$) while the median regression minimizes the sum of absolute errors (i.e. $\sum_i |e_i|$). Because of the symmetric nature of the loss functions in both cases, both methods impose the same penalty for the prediction error of a given magnitude, regardless of the direction of this error. Quantile regression on the other hand minimizes an asymmetrically weighted sum of absolute residuals. Thus we tilt the absolute value so as to produce an asymmetric weighting that yields the other quantiles, this is done by imposing an asymmetric penalty of $(1-\tau)|e_i|$ for over prediction and $\tau|e_i|$ for under prediction.. For example if an under-prediction is three times more costly than an over-prediction, then we may choose $\hat{z}$ such that $P(Y \leq \hat{z})$ is three times greater than $P(Y > \hat{z})$, i.e. the penalty for under prediction will be three times as much as that for over prediction in order to compensate. Therefore, given some $\tau \in (0,1)$, we find $\hat{z}$ to minimize the expected loss

$$Q_Y(\tau) = E\rho_\tau(Y-z) = (\tau-1)\int_{-\infty}^{z}(y-z)dF(y) + \int_{z}^{\infty}(y-z)dF(y) \tag{3.5}$$

Taking the directional derivative of $Q_Y(\tau)$ with respect to z from both the left and right, and setting it to zero gives

$$(1-\tau)\int_{-\infty}^{z} dF(y) - \tau\int_{z}^{\infty} dF(y) = 0$$

and this gives $F_Y(z) - \tau = 0$. If the solution is a unique , then we have $F_Y^{-1}(\tau) = z$, otherwise we have an interval of τth quantile of Y from which to choose the minimum.

Thus, this reduces the problem of finding the τth sample quartile from ordering and sorting of the data, into a simple optimization problem, and the quantile regression estimator is asymptotically normally distributed. The observation that quantiles may be expressed as the solution to a simple optimization problem leads to a more general method of estimating models of conditional quantile functions, and as presented in Koenker (2001) and Koenker (2005), the ordinary least squares offers a template for how to proceed with this.

Given a random sample $\{y_1, y_2, ..., y_n\}$, using OLS methods, we solve

$$\min_{\mu \in \Re} \sum_{i=1}^{n} (y_i - \mu)^2$$

and if we express the conditional mean of y given x as $f(x) = x'\beta$, then we estimate β by solving

$$\min_{\beta \in \Re} \sum_{i=1}^{n} \left(y_i - x'\beta\right)^2 \tag{3.6}$$

Using similar reasoning for quantile regression, at the τth quantile, $\hat{\alpha}(\tau)$ solves

$$\min_{\alpha \in \Re} \sum_{i=1}^{N} \rho_\tau (y_i - \alpha)^2$$

and if we specify the τth conditional quantile function as $Q_Y(\tau|x) = x'\beta(\tau)$, then $\hat{\beta}(\tau)$ solves

$$\min_{\beta \in \Re^p} \sum_{i=1}^{N} \rho_\tau \left(y_i - x'\beta(\tau)\right) \tag{3.7}$$

Equation 3.7 may be reformulated as a linear program by introducing slack variables $\{u_i, v_i : i = 1, 2, ..., n\}$ representing positive and negative parts of the residual $(y - x'\beta)$, yielding the problem

$$\min_{(\beta, u, v) \in \Re^p \times \Re^{2n}} \left\{ \tau 1_n' u + (1-\tau) 1_n' v | X\beta + u - v = y \right\} \tag{3.8}$$

Where 1_n is an n-vector of ones and X is the $n \times p$ regression design matrix.

For example, given a simple bivariate model $y_i = \beta_0 + x_i\beta_1 + u_i$ with iid errors. The conditional quantile function for this model is given as

$$Q_Y(\tau|x) = \beta_0 + x_i\beta_1 + F_u^{-1}(\tau) \tag{3.9}$$

Where F_u is the cumulative distribution function of the errors. $\hat{\beta}(\tau)$ estimates the population parameters $\left(\beta_0 + F_u^{-1}(\tau), \beta_1\right)'$.

Model Estimation

To estimate the model in Equation 3.1 using QR, I first express the family of conditional quantile functions as

$$Q_{wel}(\tau|X) = \beta_0 + \beta_1 fdi_{it} + \mathbf{w'_{it}}\boldsymbol{\beta_2} + F_u^{-1}(\tau) \tag{3.10}$$

where $F_u^{-1}(\tau)$ is the inverse cumulative distribution function defined in Equation 3.3 with $y_i = wel_{it}$. I therefore estimate equation 3.10 by solving

$$\underset{\hat{\beta}(\tau)}{argmin} \sum_{wel_{it}} \rho_\tau \left(wel_{it} - \beta_0(\tau) - \beta_1(\tau) * fdi_{it} - \mathbf{w'_{it}} * \boldsymbol{\beta_2}(\tau) - F_u^{-1}(\tau) \right) \tag{3.11}$$

where ρ_τ is as defined in Figure 3.1 and $\hat{\beta}(\tau)$ is a vector of parameters estimates of the model that converges to $\left(\beta_0(\tau) + F_u^{-1}(\tau), \beta_1(\tau), \beta_2(\tau)\right)$.

If we let $y_i = wel_{it}$ and $x_i'\beta(\tau) = \beta_0 + \beta_1(\tau) * fdi_{it} + \mathbf{w'_{it}} * \boldsymbol{\beta_2}(\tau) + F_u^{-1}(\tau)$, then 3.11 can be written as

$$Q(\beta(\tau)) = \sum_{y_i} \rho_\tau \left(y_i - x_i'\beta(\tau) \right) = \sum_{i:y_i \geq x_i'\beta}^{N} \tau |y_i - x_i'\beta(\tau)| + \sum_{i:y_i \leq x_i'\beta}^{N} (1-\tau)|y_i - x_i'\beta(\tau)|, \ \tau \in (0,1) \tag{3.12}$$

Thus, the τth QR estimator, $\hat{\beta}(\tau)$ is obtained by minimizing the objective function 3.12 over $\beta(\tau)$, with different choices of τ giving different parameter estimates, which is the crux of using QR.

This function is non-differentiable, thus ruling out the usual optimization methods. The classic solution method for estimating it is by linear programming through the simplex method. The VCE for this model is estimated using bootstrap standard errors. These standard errors are robust but are not assumed to be identically distributed. If $\tau = 0.75$ for example, then much of the weight in the estimation of $\tau(0.75)$ will be placed on observations with $y_i \geq x_i'\beta$ than on observations with $y_i \leq x_i'\beta$.

3.4 The Data

To investigate the effects of FDI on economic welfare in sub-Saharan Africa, the two main variables of interest used in this study include foreign direct investment flows and final household consumption expenditures for this countries, both measured in per capita terms.

Given the increasing consensus in the development literature regarding the use of consumption as a better measure of economic welfare. It has also been widely recognized that measures of consumption obtained from national household consumption and expenditure surveys[6] represent the best measure of consumption for this purpose. Questionnaires for the purpose of household income and expenditures surveys are designed to collect exactly this kind of information. However, household surveys have several disadvantages, some of which include the fact that they are less frequent due to the costs associated with conducting them. Another disadvantage reflect that fact not only that household surveys are conducted at irregular intervals within countries, but also that the periods of data collection are different between countries. Although countries attempt to follow certain accepted conventions in their data collection and reporting, there are often significant differences in the data collection and reporting. These problems pose difficulties not only in studying patterns of changes in welfare over time, but also when comparing welfare across countries. To mitigate against these problems, this study uses the final household consumption expenditures obtained from the national accounts. In a World Bank Policy Research paper, Ravallion (2001) performed tests to investigate the relationship between measures of welfare obtained from household surveys with those from the national accounts. He concludes that, "one cannot reject the null hypothesis that the level of private consumption per capita from the national accounts is an unbiased estimate of mean household expenditure per person from nationally representative sample surveys".

This study therefore uses per capita household final consumption expenditure from the United Nations Statistical Division (UNSD), hosted by Knoema database. This data measures the market

[6]The Living Standards Measurement Surveys (LSMS) established by the World Bank in 1980 to explore ways of improving the type and quality of data from developing countries has proven to be one of the most widely used surveys in evaluating welfare in these countries. See "A guide to living standards measurement study surveys and their data sets" by (Grosh & Glewwe, 1995)

value of household final consumption expenditure and includes the value of all goods and services, including durable goods purchased by households. It leaves out the value of purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses expenditures of nonprofit institutions serving households (NPISH). Household consumption expenditure is divided by the total population to obtain the average annual household expenditure which is used as an indicator of welfare in this study. A further discussion of the history and evolution of welfare measurements follows in the next sub-section.

The data on FDI flows comes from the database of the United Nations Conference on Trade and Development (UNCTAD). Several sources of data on FDI exist, among them the World Bank's WDI, the Organization foe Economic Development and Coorperation (OECD) development database, and the Internatinal Monetary Fund (IMF) Balance of Payments database. With the exception of the OECD which contains FDI data mainly from OECD countries, data from the other three sources closely match each other.

Very few empirical studies exist on the determinants of welfare, in addition, most studies use economic growth as an indicator of welfare. Thus little or no strong theoretical basis exist on the factors that determine economic welfare, particularly in developing countries. This makes it challenging to come up with other explanatory variables in estimating a model of economic welfare. This study however identified several key variables/factors that could have a direct impact on economic welfare particularly in the context of sub-Saharan African countries. These include per capita income, general government spending, and foreign aid flows. As discussed in 3.2, some scholars use income as an indicator of welfare, thus income explains economic welfare. Government spending can also be used to improve economic welfare through poverty alleviation programs, thus the use of welfare as an explanatory variable in the model. Data on income and government spending both come from the World Bank's WDI. Official Development Assistance (ODA), commonly known as foreign aid, comes in different form but most of it is allocated to programs designed to promote development in recipient countries, the main goal of which is to

improve economic welfare in recipient countries. This data comes from the Organization for Economic Cooperation and Development (OECD) database (DAC2a).

Other variables considered to influence welfare in SSA countries include population growth rate, gross fixed capital formation, and the legal origin of countries. The level and nature of FDI flows in a country to a large extent also depends on the legal origin of the host country. Generally countries with a French legal origin have different laws governing foreign investors compared to countries with an English legal origin, and the differences can have significant implications on the welfare effects of FDI and other development programs in the host country. In recognition of this, I control for the countries' legal origin using the variable ENGL which takes the value one (1) for countries of English legal origin and zero (0) otherwise.

3.5 Results

This study seeks to investigate the impact of FDI flows on economic welfare in SSA. More specifically to answer the question "does foreign direct investment promotes economic welfare in sub-Saharan Africa?" To answer this question, the study uses quantile regression approach to estimate the effects of FDI across the conditional distribution of welfare for a sample of 47 SSA countries covering the period 1990–2011.

Table A.10 shows the summary statistics for the main variables used in the analysis. Based the set of countries in the sample and for the period covered in this study, welfare and per capita FDI flows to the region average $790 and $68 annually, with standard deviations of 1,243 and 264 respectively. The summary statistics also support the arguments against using income as a measure of welfare, as indicated by the higher variability of income compared to consumption. However, although both welfare and FDI are positively skewed and leptokurtic relative to the rest of the other variables, these features are more pronounced in the case of FDI. The summary statistics by welfare quantiles are shown in Table (A.12) further highlight the features of the variables. These summary statistics show that average per capita FDI flows increases with higher levels of welfare,

a further indication that regions with greater welfare attracts higher levels of FDI per capita.

The first two columns of Table A.13 show results from the OLS (mean regression) estimation of the baseline model, with the standard errors in parentheses. The OLS results indicate that increasing FDI per capita by US$1 improves economic welfare (average consumption) by US$0.47 in SSA, and this result is shown to be significant in column 1. These results, as discussed in Subsection 3.3.2.1, provide an estimate of the average effects FDI flows on economic welfare, and gives rise to a host of questions regarding the impact of FDI on welfare in the region. How is this welfare gain distributed across countries/individual with different levels of welfare? Do countries across the conditional distribution of welfare benefit equally from increases in FDI or do those at the higher welfare quantiles benefit more? The answers to these questions could not be obtained from the OLS estimates which implicitly assumes a pure location shift effect. If there was a pure location shift in the distribution of welfare across countries, then the estimates at different quantiles will not be significantly different from the OLS estimate. To test this, I compare the QR estimates in Columns 3-9 of Table 3.3.2.1 (for the $\tau = 0.05, 0.10, 0.25, 0.50, 0.75, 0.90$, and 0.95 quantiles) - with the bootstrap standard errors in parenthesis - to the OLS estimates.

The QR estimates are obtained using bootstrapped quantile regression, and the results show that increasing FDI flows have a negative impact on countries in the lower welfare quantile ($\tau = 0.05$), with this effects improving but remaining negative up to the median ($\tau = 0.50$). The Impact of increasing FDI on welfare becomes positive at the upper quartile ($\tau = 0.75$) of the welfare distribution and continues to increase, attaining a maximal positive impact on countries at the top welfare quantile ($\tau = 0.95$). Two conclusions can be drawn from these results: first, that increased flows of FDI to SSA improves welfare in countries (or periods) with higher levels of welfare while it either hurts or has no significant effect those at the bottom end of the welfare distribution; and second, that this pattern represents more than just a location shift, it reflects the nature of the conditional welfare distribution. However, the effects of FDI on welfare fails to be significant for columns 3, 6, and 7, corresponding to the 5th quantile, median and upper quantile respectively.

The results show further that the QR estimates differ significantly from the OLS estimate at the

95% confidence level, as the 95% confidence interval of the QR estimate precludes the OLS estimate, i.e. $\beta_{ols} \notin (\beta_{QR} - 1.96se_{QR},\ \beta_{QR} + 1.96se_{QR})$. Apparently, QR is of little practical relevance if the QR estimates are not significantly different from the OLS estimate. The OLS estimate do not accurately describe the impact FDI flows on countries at different levels of welfare, as it clearly over estimates the effects of FDI on welfare for those countries at the lower end of the conditional distribution, and the QR estimates give a complete characterization of the the conditional distribution of economic welfare in SSA. The graphs of the QR results in Figure A.8 further illustrates this. In the graphs, the vertical axis represents the parameter estimates and the horizontal axis represents the quantiles. The dark horizontal dashed line represent the OLS estimate, and the lighter dashed lines around this estimate represent its the 95% confidence intervals. The OLS estimate is constant across all quantiles as shown by its horizontal nature. The QR estimates are represented by the solid lines that vary across quantiles and the light shaded area around these line represents the 95% confidence interval of the QR estimates at different quantiles. Of particular interest is the top middle graph (labelled B. FDI per capita), showing both the OLS and QR estimates of the effects of FDI on economic welfare. As this graph shows, the QR estimate lies below the OLS estimate up to about the 80% quantile, and is above it beyond that. The QR estimate is also shown to lie outside of the 95% confidence interval for the OLS estimate, further confirming that the QR estimates are significantly different from the OLS at different quantiles. The QR estimates also prove to be significantly different from the OLS estimates for three other explanatory variables (income, government spending and ODA) and the constant term. The results are also illustrated in Figure A.5 which shows the OLS and quantile regression lines. As the figure shows, the red dotted line represents the OLS regression line and the blue line represents the median regression line. The other gray lines represent the QR lines, with these lines becoming steeper as as we move up in the quantiles. The steeper lines represent the higher quantiles while the flatter lines represent the lower quantiles.

An examination of the household consumption and expenditure surveys from a few SSA countries shows that rural residents enjoy a relatively low levels of welfare compared to urban residents,

and this is shown to be true for all countries for which survey data is available. Also, as shown in Table A.2, FDI flows to SSA in the last five years go to a few (mostly oil producing) countries with the top-ten countries receiving on average nearly 80% of the overall FDI flows into the region. This proves important as it may help to explain the findings in this study.

Other results from Table A.13 show, that income has a positive and highly significant effect on welfare, and these estimates are also shown to be significantly different form the OLS estimates. Another interesting result is the effect of foreign aid (ODA) on welfare, which show that foreign aid has a positive and significant effect on economic welfare with a greater positive impact for the lower quantiles relative to the higher welfare quantiles. It however fails to be significant for the top two quantiles, and the estimates do not differ significantly from their OLS counterparts. Population growth is shown to have a significantly negative affect welfare, and the magnitude of the negative effects increases for those in the upper welfare quantiles. This may be indicative of the high level of dependency in SSA, as population growth particularly among the poor tends to increase the rate of dependency which weighs heavily on the more affluent. The results also show that increased government spending have a greater positive effect on the higher welfare quantiles.

Robustness Tests

As a first step towards testing the robustness of the results discussed above, I test whether the QR estimates for the FDI are significantly different across quantiles. The results of the test show that the QR estimates of the coefficients of FDI differ significantly at different conditional quantiles. The null hypothesis of equality of the QR coefficient estimates at different conditional quantiles is soundly rejected at the 95% confidence level. This test results are further strengthened by the plots of the QR estimates in Figure A.8, described above.

To further test the robustness of the QR estimates, I estimate the model with additional explanatory variables, among them the gross fixed capital formation (GFCF), human capital development and the legal origins of the countries covered in the sample. The results from these estimates are shown in Tables A.14, A.15, A.16. The results from these estimations do not differ significantly

from those in Table A.13. Table A.14 shows the results when controlling for the countries' legal origin (English or French legal origin). The estimation used English and so the results are reported relative to the French legal origin. To start with, the QR results are shown to be robust to the introduction of the countries' legal origin, and the estimate for ENGL shows that English countries receive greater welfare relative to countries with a French legal origin. Table A.16 also includes a square term of FDI, which is shown to have a negative effect on welfare.

3.6 Conclusions and Discussions

This study has examined the effects of foreign direct investment on economic welfare in sub-Saharan Africa. Using the quantile regression estimation techniques with bootstrap standard errors, the study has shown that the effects of FDI on welfare depends on the level of welfare already attained. Moreover, FDI is shown to have a negative and partially significant effect on welfare for the lower to upper-middle welfare quantiles while its effects on the upper welfare quantiles are shown to be positive and highly significant. Tests further indicate that the QR estimates significantly differ from those obtained from OLS methods, which shows that the effect FDI on welfare is on average positive. Additional tests show the QR estimates for the different quantiles to be significantly different at the 5% level. These test results represent a further justification of the main findings in this study, that FDI impacts different segments of the SSA population differently depending on their level of welfare.

This study and its results contrast with other studies in two respects. First, this represents the first study investigating the effects of foreign investment flows on economic welfare in the sub-Saharan African region. This proves important because as sub-Saharan African countries work to achieve the Millennium Development Goals (MDGs), the economic welfare especially of the poor remains the focus of most of their development policy initiatives. Moreover, considering that foreign investment is strategically positioned to help these countries achieve these goals, having an understanding of its effects on economic welfare proves important in formulating and revising

development policies in these countries. Secondly, as a review of the literature shows, the effects of the activities of foreign investors tend to be mixed with some studies finding a positive impact while others claim that FDI hurts welfare in the host countries. The results of this study to some extent explains the reasons for these differences, as it is shown that FDI promotes the welfare of some while it fails to improve well being in other parts of the region.

Two possible explanations could be given for these findings. First of all, most sub-Saharan African countries are characterized by huge developmental gaps between the urban and rural areas within the same country. This gap plays a critical role in the final destination of most foreign investment projects as they are mostly located in the urban areas, which have a much improved infrastructure and a more readily available labor force. This further deepens the opportunity gap between the poor who mostly reside in the rural areas and tend to predominantly be in the lower welfare quantiles, and the already well-off urban residents. This proves important because as a review of household surveys from three SSA countries indicate, urban residents enjoy a significantly greater welfare than their rural counterparts. This is in part the reason for the massive rural-urban migration in most SSA countries. Secondly, aside from oil and other natural resources which remain the main drivers of foreign investments flows into SSA, a good proportion of foreign investments to the region also go to the service sector - financial services and telecommunications, and light manufacturing, benefits some parts of the region than others.

The findings of this study that foreign investment only benefit those with already higher levels of welfare provides an avenue for formulating policies to improve its effects on those at the bottom of the welfare ladder. Such policies should focus on not only attracting foreign investors, but also on creating opportunities for those in the rural areas to benefits from the FDI flows. Further studies on this issue could focus on examining the impact of FDI flows for specific countries using case studies.

Chapter 4

Conclusions

This study has focused on investigating the impacts of foreign direct investment flows to sub-Saharan African. The motivation behind this study rests on the continued reliance on foreign capital flows, particularly FDI by SSA countries as the main source of capital for investment. Over the last couple of decades, beginning in the early 1990s, foreign investors responded to incentives provided by many SSA countries in the form of improved investment policy frameworks, as the region boast record levels of foreign investment flows. This study examine the impact of the increased FDI flows on economic development in the region by first investigating the impact of domestic factors on the relationship between FDI and growth, and secondly by investigating the impact of FDI on economic well being in the region.

The first part investigates what role domestic factors (human capital, institutions, infrastructure and financial development) play in the FDI-growth nexus. The results find that institutions and financial sector development have a positive impact on the relationship between FDI and growth in the region. These results fall in line with Durham (2004)[1] and Alfaro et al. (2010)[2] both of which find evidence to support the hypothesis that financial sector development plays a positive role in promoting the impact of FDI on growth. This finding also reinforces the arguments for promot-

[1]Durham (2004) used a sample of 80 countries for the period 1979-1998. The sample of countries range from industrialized to developing countries.

[2]This study use a hybrid of theoretical and empirical methods to investigate the effects of financial development on the FDI-grwoth relationship.

ing financial sector development in SSA countries, as this could enhance transactions both within host countries as well as international transactions. The second result also in line with Durham (2004) finds institutions to have a significantly positive effect on the relationship between FDI and growth, adding to the list of studies that find a positive role for institutions in developing countries. Because of their central role in maintaining an organized and a predictable investment atmosphere, improved institutions do not only attract foreign investors, but also help in the efficient allocation of these flows. However, unlike Borensztein et al. (1998) this study finds human capital and infrastructure to have negative affects the relationship between FDI and growth. One conclusion that can be drawn from the negative impact of human capital and infrastructure is that these factors do not align with the needs of foreign investors in a way that could be complementary. With the exception of a few, most SSA countries still maintain an infrastructure not capable of meeting the needs of 21st century investments demands. The impact of this on FDI is two-fold, first it serve as a disincentive to foreign investors looking to invest in these countries, and as a result these countries fails to attract high quality investment that could have a significantly positive economic impact. Regarding human capital, although most SSA countries have made tremendous progress in the last couple of decades in developing their human capital base, however the inability to retain quality human capital in these countries continue to pose challenges in their human capital needs. This in addition to the hiring practices of some foreign investors may be responsible for the results obtained in this study. However, further analysis show that the negative effects of human capital and infrastructure on the FDI-growth relationship is on average not currently been felt in the region, as the levels of human capital and infrastructure are well below that threshold level beyond which the negative effects could kick in. I must warn readers however that this could be different for individual countries in the region. To further understand these issues requires detailed country case studies to enable a thorough investigation of these issues within individual countries. However, this study provides a step in the right direction towards understanding how SSA countries could maximize the growth effects of FDI.

In an effort to delve deeper into the impact of FDI flows to SSA beyond its growth narrative,

the second part of this study investigate the extent to which increased FDI flows to SSA improves economic welfare in the region. Using a quantile regression approach, this study investigate the effects of FDI at different levels of welfare. Results from quantile regression methods show that increased FDI flows do not have the same impact on countries with higher welfare levels as it does on those with lower levels of welfare. Increasing FDI flows, the results show, have a significantly positive effect on countries with higher levels of welfare, while it is shown to negatively impact (or have no significant effect on) welfare for those in the lower welfare quantiles. These results contrast with those from the mean regression, which show that FDI improves economic well being in SSA.

The implication of these findings is that, for SSA those who already enjoy a higher level of welfare, stand to benefit from increased FDI flows, whereas the poor with lower welfare tends to be hurt from increased FDI inflows. Given the overall levels of development in the region, the success of any major development program should be judged by its impact on the poor who fall in the lower end of the conditional welfare distribution. Judging by this standard, it can be noted that policies to attract FDI have so far not achieved its goal of overall development in the region. One possible reason for this has to do with the allocation of FDI flows which tend to overwhelmingly benefit individuals and countries with already high standards of living. The bulk of the FDI flows to SSA go to a few resource rich countries,[3] and within these countries, most FDI flows are either concentrated in a few large capital intensive activities or in the major cities or both, with no direct impact in the vast majority of the populations in these countries. Thus while a few countries and a few individuals within these countries benefit vastly from FDI flows to the region, the vast majority are either hurt or fail to benefit from these flows. As with the first part of this study, this issue could be further understood by examining individual country case studies.

[3] According to data from the UNCTAD database, FDI flows to Nigeria alone averaged a little over one fifth of all FDI flows to the region in the last decade. The top receivers of FDI in the last five years include Nigeria, South Africa, Ghana, DR Congo and Mozambique among others. Moreover, the top ten recipients of FDI within the last decade averaged about 80% of all FDI flows to the region.

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Appendix A

Result Tables and Graphs

A.1 Appendix 1: FDI Growth Channels

Table A.1: Trends in FDI Flows (US$ Millions)

Period	1970-1979	1980-1989	1990-1999	2000-2009	2010	2011	2012
World	**23,969.20**	**92,927.58**	**402,709.06**	**1,171,642.91**	**1,408,536.88**	**1,651,510.88**	**1,350,925.73**
Developed economies	18,047.70	72,293.02	279,616.74	756,805.24	696,417.77	820,008.46	560,718.10
America			206,826.20	215,741.77	227,240.10	268,213.77	213,123.10
Asia	191.60	297.92	3,914.88	15,410.44	4,258.71	9,325.07	12,144.91
Europe	10,261.92	30,368.35	167,700.79	501,662.06	429,229.75	472,852.22	275,580.07
Oceania	1,240.56	4,163.96	8,309.29	23,990.97	35,689.21	69,617.39	59,870.02
EU27 (European Union)	9,940.21	29,027.96	160,654.88	476,448.90	379,444.45	441,556.62	258,514.03
G8	13,167.71	55,765.56	176,072.08	476,439.95	419,746.05	494,597.17	369,775.23
Developing economies	5,921.50	20,626.44	118,673.59	368,662.95	637,062.98	735,212.22	702,825.60
Africa	1124.17	2,201.69	6,741.20	31,032.54	43,581.57	47,598.08	50,041.06
Sub-Saharan Africa	942.16	1,313.43	4,820.63	20,266.59	29,936.61	41,793.51	41,005.61
SSA excluding South Africa	849.94	1,299.27	3,970.19	16,570.73	28,708.26	35,789.22	36,433.12
America	2,818.46	6,576.20	42,006.59	109,062.99	189,855.20	24,9431.83	243,861.00
Central America	700.19	2,597.17	9,891.76	27,775.02	27,699.89	29,906.71	21,733.44
South America	1,718.55	3,577.80	26,695.53	49,176.30	92,134.00	129,423.44	144,402.13
Asia	1,902.10	11,695.60	69,650.70	227,564.75	400,687.32	436,150.30	406,769.86
China	0.01	1,618.65	29,042.70	68,642.40	114,734.00	123,985.00	121,080.00
Oceania		310.73	275.10	1,002.66	2,938.89	2,032.01	2,153.68
Transition economies	0.00	8.12	4,418.73	46,174.72	75,056.13	96,290.20	87,382.04
LDCs	305.11	505.20	2,621.60	10,733.40	18,751.32	21,442.94	25,703.03

Table A.2: Top Ten Recipients of FDI in SSA in the Past Five Years

2008		2009		2010		2011		2012	
Country	%SSA[a]	Country	%SSA	Country	%SSA	Country	%SSA	Country	%SSA
South Africa	23.5	Nigeria	23.7	Nigeria	20.4	Nigeria	21.3	Nigeria	17.1
Nigeria	21.5	South Africa	14.7	Congo D.R.	9.8	South Africa	14.4	Mozambique	12.7
Sudan	6.8	Ghana	7.9	Eq. Guinea	9.1	Ghana	7.8	South Africa	11.2
Congo	6.6	Angola	6.0	Ghana	8.4	Congo	7.3	Congo D.R.	8.1
Congo D.R.	4.5	Congo	5.1	Congo	7.4	Sudan	6.4	Ghana	8.0
Angola	4.4	Sudan	5.0	Sudan	6.9	Mozambique	6.4	Congo	6.7
Tanzania	3.6	Eq. Guinea	4.5	Tanzania	6.1	Eq. Guinea	4.7	Sudan	6.0
Ghana	3.2	Madagascar	2.9	Zambia	5.8	Congo D.R.	4.0	Eq. Guinea	5.2
Madagascar	3.0	Tanzania	2.6	South Africa	4.1	Tanzania	2.9	Uganda	4.2
Zambia	2.4	Mozambique	2.4	Mozambique	3.4	Zambia	2.7	Tanzania	4.2
	79.5		74.8		81.4		77.9		83.4

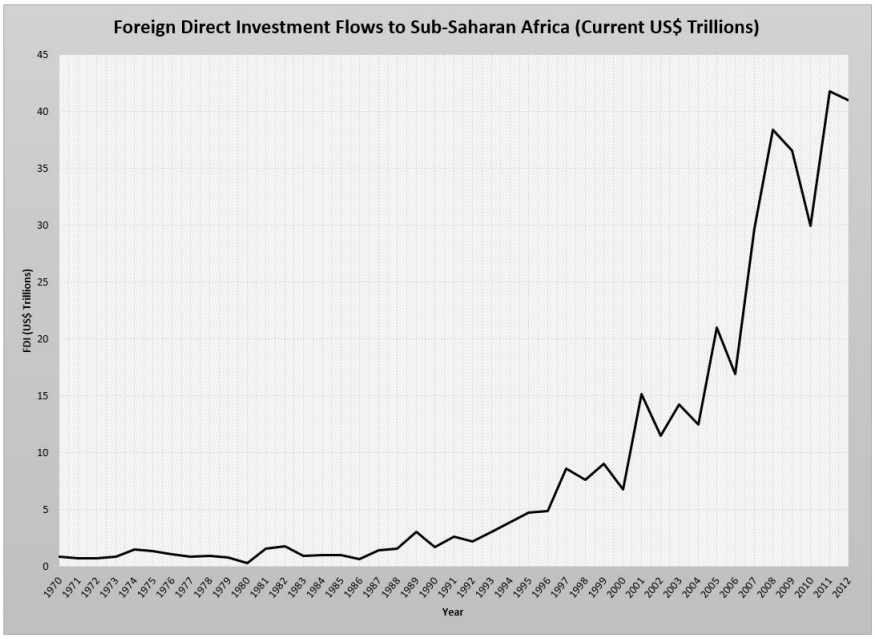

Figure A.1: Annual Foreign Direct Investment Flows to Sub-Saharan Africa 1970-2012 (US$ Trillions)

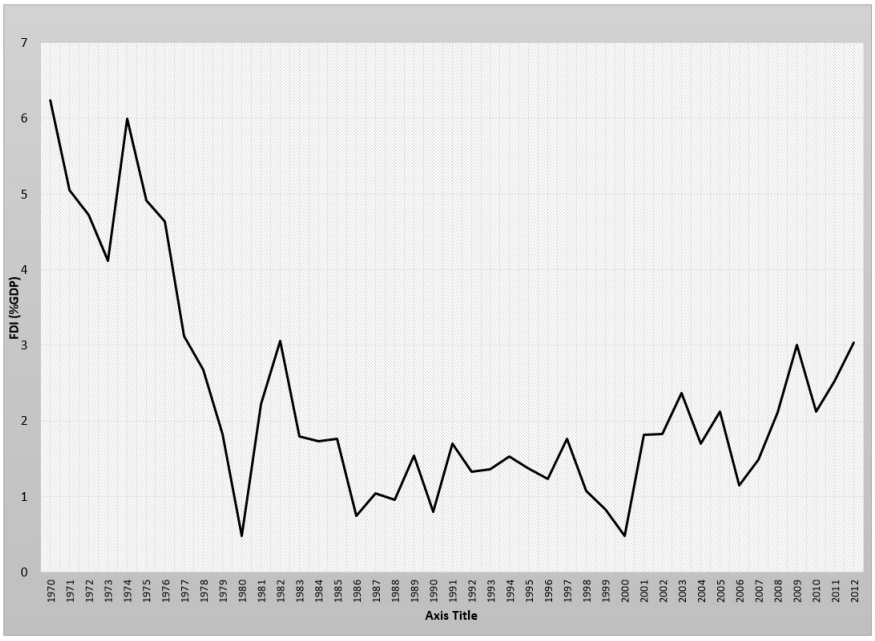

Figure A.2: Annual FDI flows to SSA as a Percentage of the World, 1970-2012

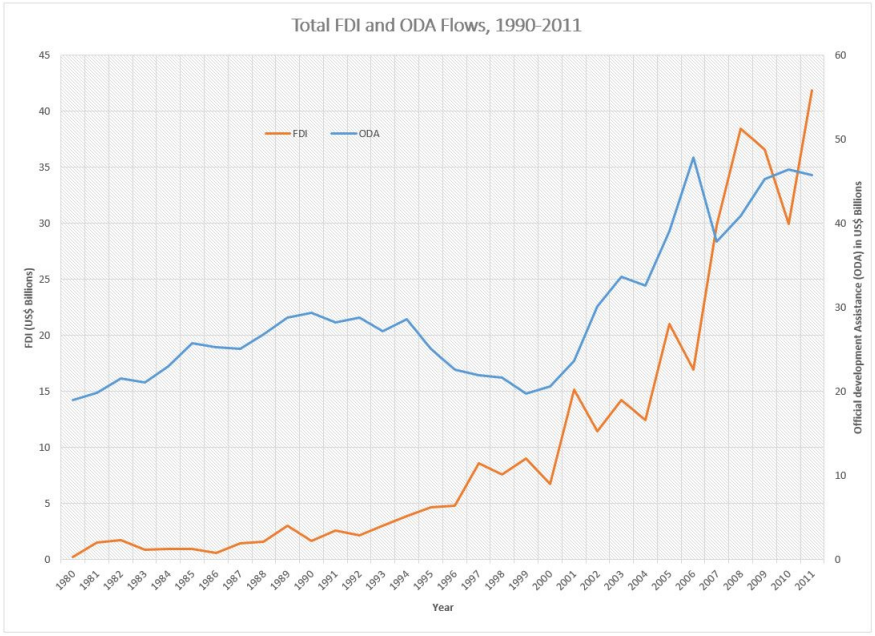

Figure A.3: FDI and Official development Assistance (ODA) flows into SSA, 1980-2011

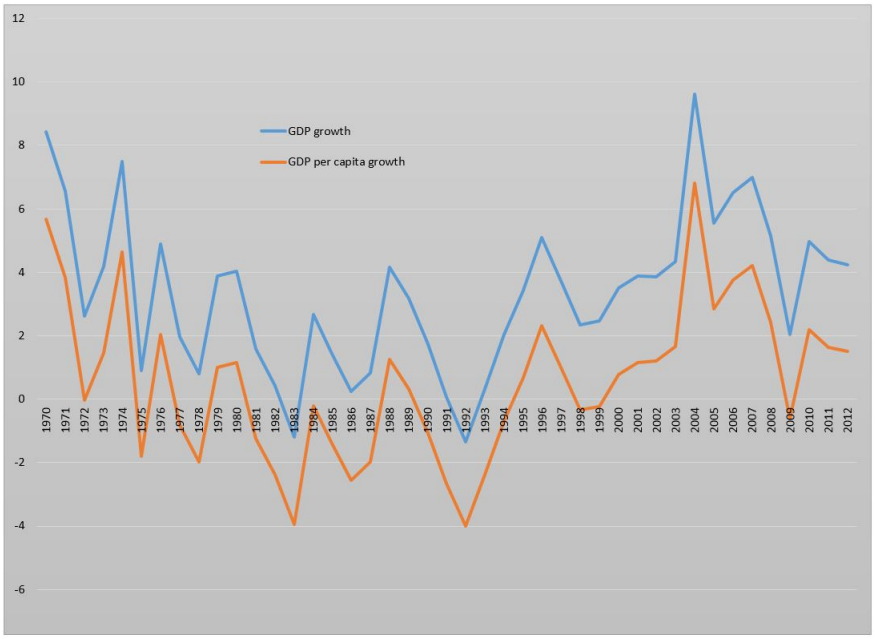

Figure A.4: Annual Growth rate of GDP and GDP per Capita for SSA, 1970-2012

Table A.3: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
gdpcap	262	1348.006	2165.333	85.9885	13536.63
grwth	260	1.0357	4.6043	-21.6275	30.9820
fdi	263	3.1731	5.7921	-3.8615	49.2697
hcap	192	1.7381	0.3939	1.1004	2.8137
sch_sec	192	1.0983	0.7802	0.07	3.19
crprvt	254	17.7580	19.0794	0.9967	156.8575
crbkng	254	30.5593	37.5571	-61.0540	319.5388
M2	255	27.4793	17.3502	1.0305	103.4364
govstab	186	0.5686	0.2145	0	0.9160
corrup	186	0.3885	0.1770	0	1
lawodr	186	0.4401	0.1832	0	1
gfcf	245	19.6864	10.1443	3.0629	84.6254
tele	264	1.9806	4.3842	0.0188	28.7401
govt	246	15.5172	6.7748	3.5443	42.1947
trade	260	71.8317	36.7257	13.3759	230.7528

Table A.4: Estimation Using First-Difference Transformation with Unorrected Standard Errors

Variables	Financial Sector Development			Human Capital		Institutions			Infrastructure	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	M2	crbkng	crprvt	H. Cap (pwt)	H. Cap (BL)	govstab	lawodr	corrup	GFCF	Tele
L.lgdpcap	0.1704***	0.1747***	0.1378***	0.1642***	0.2121***	0.1514***	0.2386***	0.1698***	0.1050***	0.1529***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lingdp	-0.1674***	-0.1664***	-0.1502***	-0.2593***	-0.2303***	-0.1870***	-0.3090***	-0.2055***	-0.1315***	-0.1672***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
fdi	0.0213***	0.0172***	0.0280***	0.1759***	0.0850***	-0.0010	0.1132***	-0.0054	0.0219***	0.0335***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.584)	(0.000)	(0.239)	(0.000)	(0.000)
M2	-0.0034***	-0.0030***	0.0005	0.3140***	0.0327**	0.3026***	0.7943***	0.1280**	0.0072***	0.0107***
	(0.000)	(0.000)	(0.460)	(0.000)	(0.023)	(0.000)	(0.000)	(0.016)	(0.000)	(0.000)
fdi_M2	0.0004***	0.0002***	-0.0000	-0.0787***	-0.0334***	0.0303***	-0.1686***	0.1011***	-0.0001***	-0.0017***
	(0.000)	(0.000)	(0.998)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Obs.	215	215	215	159	159	153	153	153	205	218
No. of id	44	44	44	32	32	31	31	31	42	44
no. of Inst	24	24	24	24	24	25	25	25	24	24
sarganp	0	2.74e-09	0	1.18e-08	0.00771	1.31e-10	4.40e-06	1.09e-10	2.71e-08	6.20e-11
hansenp	0.130	0.433	0.459	0.239	0.560	0.446	0.206	0.250	0.0815	0.285
ar1p	0.340	0.278	0.0353	0.934	0.392	0.260	0.599	0.192	0.0348	0.0355
ar2p	0.130	0.222	0.128	0.160	0.115	0.217	0.0894	0.151	0.214	0.113

Models estimate the factors that enhance/mitigate the effects of FDI on economic growth in SSA, dependent variable is log (per capita income). The models are estimated using the system GMM technique, using only the second lags of endogenous variables in levels and the first and higher lags of predetermined variables in levels as instruments for the first-difference equation. P-values are in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.5: Results From First-Difference Transformation with Robust (Windmeijer Corrected) Standard Errors

Variables	Financial Sector Development			Human Capital		Institutions			Infrastructure	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	M2	crbkng	crprvt	H. Cap (pwt)	H. Cap (BL)	govstab	lawodr	corrup	GFCF	Tele
L.lgdpcap	0.1704***	0.1747***	0.1378***	0.1642	0.2121	0.1514***	0.2386	0.1698	0.1050***	0.1529***
	(0.000)	(0.000)	(0.001)	(0.116)	(0.295)	(0.000)	(0.120)	(0.146)	(0.001)	(0.000)
lingdp	-0.1674***	-0.1664***	-0.1502***	-0.2593**	-0.2303	-0.1870***	-0.3090*	-0.2055**	-0.1315***	-0.1672***
	(0.000)	(0.001)	(0.002)	(0.013)	(0.219)	(0.000)	(0.069)	(0.039)	(0.000)	(0.000)
fdi	0.0213**	0.0172*	0.0280**	0.1759***	0.0850	-0.0010	0.1132*	-0.0054	0.0219**	0.0335***
	(0.019)	(0.072)	(0.034)	(0.006)	(0.110)	(0.899)	(0.092)	(0.794)	(0.024)	(0.000)
M2	-0.0034	-0.0030***	0.0005	0.3140***	0.0327	0.3026***	0.7943**	0.1280	0.0072**	0.0107**
	(0.330)	(0.000)	(0.870)	(0.005)	(0.785)	(0.003)	(0.038)	(0.656)	(0.024)	(0.044)
fdi_M2	0.0004	0.0002***	-0.0000	-0.0787**	-0.0334*	0.0303**	-0.1686	0.1011***	-0.0001	-0.0017***
	(0.487)	(0.000)	(0.999)	(0.010)	(0.096)	(0.014)	(0.176)	(0.004)	(0.173)	(0.000)
Obs.	215	215	215	159	159	153	153	153	205	218
No. of id	44	44	44	32	32	31	31	31	42	44
no. of Inst	24	24	24	24	24	25	25	25	24	24
sarganp	0	2.74e-09	0	1.18e-08	0.00771	1.31e-10	4.40e-06	1.09e-10	2.71e-08	6.20e-11
hansenp	0.130	0.433	0.459	0.239	0.560	0.446	0.206	0.250	0.0815	0.285
ar1p	0.410	0.364	0.0591	0.943	0.590	0.267	0.774	0.214	0.0482	0.0382
ar2p	0.135	0.223	0.129	0.198	0.145	0.220	0.108	0.158	0.218	0.114

Models estimate the factors that enhance/mitigate the effects of FDI on economic growth in SSA, dependent variable is log (per capita income). The models are estimated using the system GMM technique, using only the second lags of endogenous variables in levels and the first and higher lags of predetermined variables in levels as instruments for the first-difference equation. P-values are in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.6: Averages of Variable by Countries

	Country	FDI (% GDP)	GDP Per Cap	Real GDP growth	M2 (% GDP)	Credit provided by Banking Sector (% GDP)	Credit to Private Sector (% GDP)	No. of tele per 100 people	Gross Fixed Cap. Formation (% GDP)	Human capital - Barro-Lee	Human capital - Penn World	Govt Stability	Govt Corruption	Law and order
1	Angola	6.23	1,571	2.51	26.89	19.47	7.01	0.61	17.02			0.65	0.42	0.39
2	Benin	1.22	494	0.73	26.30	15.99	17.82	0.65	16.83	1.03	1.45			
3	Botswana	2.84	3,918	4.63	31.20	-28.77	14.61	4.32	27.25	2.52	2.43	0.67	0.53	0.67
4	Burkina Faso	0.36	327	2.14	19.83	11.95	13.23	0.37	19.43			0.54	0.43	0.53
5	Burundi	0.14	179	-0.71	19.06	21.69	12.86	0.25	12.94	0.30	1.35			
6	Cameroon	1.10	982	-0.05	18.14	19.08	15.79	0.63	17.51	1.32	1.86	0.66	0.41	0.42
7	Cape Verde	4.52	1,499	4.37	57.96	53.61	30.44	7.63	39.51					
8	Central African Rep	1.23	403	-1.00	17.21	15.51	6.99	0.18	10.64	0.84	1.48			
9	Chad	5.92	358	2.63	13.35	11.69	6.73	0.13	15.72					
10	Comoros	0.55	684	-0.55	22.44	15.90	12.48	1.43	16.01					
11	Congo, Dem. Rep.	2.46	217	-2.68	13.60	7.88	2.56	0.06	11.24	0.71	1.48	0.46	0.09	0.17
12	Congo, Rep.	7.20	1,775	0.95	16.64	14.95	11.09	0.56	26.91	2.07	2.02	0.62	0.44	0.31
13	Cote d'Ivoire	1.32	1,066	-1.36	27.10	32.28	24.82	1.00	11.88	1.02	1.57	0.55	0.46	0.52
14	Equatorial Guinea	18.67	5,120	11.75	13.69	15.70	10.90	0.87	50.10					
15	Ethiopia	1.24	151	1.39	31.28	37.10	15.39	0.45	18.57			0.51	0.35	0.59
16	Gabon	0.46	6,912	-0.58	17.55	18.20	13.03	2.42	27.91	2.28	2.14	0.64	0.25	0.45
17	Gambia, The	3.53	432	0.15	25.20	21.86	11.79	1.72	15.17	0.95	1.37	0.55	0.40	0.57
18	Ghana	2.16	430	1.87	21.98	24.64	8.09	0.72	17.23	2.66	2.14	0.65	0.40	0.36
19	Guinea	1.58	288	0.37	12.23	13.09	4.49	0.24	17.70			0.59	0.51	0.47
20	Guinea-Bissau	0.95	455	0.67	25.28	15.20	8.84	0.57	24.98			0.42	0.28	0.21
21	Kenya	0.51	525	0.25	35.53	44.84	29.40	0.87	18.21	0.96	2.00	0.57	0.38	0.48
22	Lesotho	7.74	593	2.44	41.13	9.47	15.27	1.12	44.00	0.77	1.94			
23	Liberia	18.10	256	-0.26	33.75	164.07	12.10	0.25	13.70	1.09	1.56	0.45	0.23	0.31
24	Madagascar	2.18	299	-1.22	20.04	22.09	13.10	0.37	16.37			0.55	0.61	0.45
25	Malawi	1.35	212	0.53	19.79	22.99	10.24	0.48	16.63	0.36	1.57	0.49	0.50	0.47
26	Mali	1.24	376	1.13	23.78	17.68	15.93	0.29	20.95	0.29	1.18	0.58	0.31	0.43
27	Mauritania	3.75	680	0.36	25.33	41.83	27.92	0.73	25.28	0.61	1.54			
28	Mauritius	1.28	3,817	4.19	74.16	70.92	49.51	15.63	23.89	2.48	2.24			
29	Mozambique	3.01	231	2.28	27.78	10.88	15.06	0.36	18.29	0.13	1.17	0.60	0.48	0.41
30	Namibia	2.65	3,147	0.76	38.06	41.63	40.01	5.05	19.90	1.36	2.06	0.54	0.35	0.60
31	Niger	1.54	288	-1.69	14.88	12.98	10.25	0.19	14.76	0.27	1.18	0.51	0.33	0.38
32	Nigeria	3.18	697	0.89	24.67	26.28	15.55	0.47				0.55	0.28	0.32
33	Rwanda	0.68	253	1.73	15.74	12.50	8.22	0.18	15.23	0.33	1.45			
34	Senegal	1.17	712	0.41	26.41	29.75	23.85	1.32	21.58	0.78	1.68	0.70	0.47	0.42
35	Seychelles	7.95	9,513	2.40	63.15	71.65	18.93	18.28						
36	Sierra Leone	0.74	340	-0.25	17.29	35.29	4.00	0.43	9.57	0.74	1.39	0.52	0.30	0.46
37	South Africa	0.85	4,992	0.31	59.45	137.50	111.01	9.09	18.78	1.93	2.37	0.64	0.70	0.40
38	Sudan	3.40	554	1.88	19.72	17.64	7.36	0.72	15.14	0.55	1.39	0.50	0.25	0.36
39	Swaziland	3.82	1,977	2.51	25.57	14.08	18.25	2.47	18.44	1.62	2.17			
40	Tanzania	2.05	327	2.09	22.81	18.76	9.36	0.33	23.20	0.29	1.79	0.66	0.48	0.71
41	Togo	1.74	408	-0.85	33.51	23.31	20.60	0.88	16.29	1.47	1.77	0.58	0.31	0.42
42	Uganda	2.08	253	2.17	14.82	14.07	6.14	0.27	15.87	0.52	1.69	0.64	0.35	0.46
43	Zambia	4.44	657	-0.26	23.42	50.54	10.35	0.78	15.22	0.90	2.01	0.49	0.43	0.52
44	Zimbabwe	0.74	598	-1.36	47.00	60.18	32.47	1.78	14.20	2.00	2.16	0.55	0.33	0.41

Table A.7: Robustness Test for Government Stability

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
L.lgdpcap	0.1488***	0.0842	0.1231**	0.1662***	0.0232	0.1474***	0.1820**	0.2504***	0.1052	0.1097**
	(0.009)	(0.335)	(0.044)	(0.000)	(0.783)	(0.002)	(0.021)	(0.001)	(0.273)	(0.041)
lingdp	-0.1690**	-0.1243*	-0.1541**	-0.2132***	-0.1236**	-0.2006***	-0.2140***	-0.3504***	-0.0848	-0.1140**
	(0.013)	(0.078)	(0.012)	(0.000)	(0.011)	(0.000)	(0.006)	(0.000)	(0.487)	(0.046)
fdi	0.0150	-0.0004	0.0132	0.0047	0.0104*	0.0021	0.0712	0.0195***	0.0009	-0.0102*
	(0.397)	(0.987)	(0.539)	(0.249)	(0.082)	(0.725)	(0.260)	(0.005)	(0.873)	(0.070)
govstab	0.2386***	0.2833***	0.2314***	0.2386**	0.5112**	0.1871***	0.2967***	0.3359***	0.1672	0.1428
	(0.000)	(0.000)	(0.002)	(0.017)	(0.013)	(0.009)	(0.000)	(0.002)	(0.107)	(0.113)
fdi_govstab	0.0049	0.0189	0.0071	0.0219**	0.0142*	0.0242**	-0.0682	0.0007	0.0259***	0.0485**
	(0.852)	(0.452)	(0.827)	(0.015)	(0.063)	(0.023)	(0.374)	(0.955)	(0.006)	(0.011)
trade	-0.0005									
	(0.761)									
govt		0.0052								
		(0.527)								
svng			0.0031							
			(0.163)							
demoacc				0.2429**						
				(0.044)						
socioecon					0.8245**					
					(0.049)					
intconf						0.2853				
						(0.302)				
infcpi							-0.0000			
							(0.234)			
popn								0.1455***		
								(0.000)		
prights									-0.4225	
									(0.233)	
oda										-0.0087**
										(0.020)
Observations	151	146	146	153	153	153	140	153	153	152
Number of id	31	30	30	31	31	31	31	31	31	31
j	33	33	33	37	37	37	29	29	29	29
sarganp	5.57e-06	4.62e-06	3.49e-06	3.75e-08	8.19e-09	2.54e-08	0.00364	0.000119	3.81e-09	6.32e-08
hansenp	0.464	0.628	0.385	0.622	0.646	0.614	0.520	0.453	0.188	0.671
ar1p	0.0952	0.160	0.265	0.285	0.423	0.251	0.184	0.0149	0.241	0.230
ar2p	0.567	0.332	0.390	0.226	0.128	0.224	0.797	0.144	0.237	0.929

Table A.8: Robustness Test for Credit by Banking Sector

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
lgdpcap	0.1528***	0.2024***	0.1370*	0.1370**	0.1435	0.1182	0.1810***	0.1983***	0.0924	0.0722
	(0.003)	(0.000)	(0.054)	(0.013)	(0.102)	(0.138)	(0.000)	(0.002)	(0.123)	(0.323)
ingdp	-0.1684***	-0.1836***	-0.1496**	-0.1477***	-0.1335	-0.1496*	-0.1865***	-0.2135***	-0.0446	-0.0449
	(0.000)	(0.002)	(0.023)	(0.009)	(0.134)	(0.060)	(0.000)	(0.006)	(0.549)	(0.594)
fdi	0.0138**	0.0231***	0.0203***	0.0022	0.0059	-0.0005	0.0258***	0.0210**	0.0125	0.0159**
	(0.023)	(0.000)	(0.000)	(0.805)	(0.585)	(0.963)	(0.000)	(0.015)	(0.206)	(0.044)
crbkng	-0.0007	-0.0001	-0.0008	-0.0029***	-0.0032***	-0.0029***	-0.0006	-0.0025**	-0.0033***	-0.0026***
	(0.670)	(0.921)	(0.490)	(0.000)	(0.000)	(0.000)	(0.618)	(0.020)	(0.000)	(0.000)
fdi_crbkng	0.0001	0.0000	0.0001*	0.0002***	0.0002***	0.0002***	0.0000	0.0002***	0.0002***	0.0002***
	(0.242)	(0.921)	(0.063)	(0.000)	(0.000)	(0.000)	(0.750)	(0.001)	(0.001)	(0.000)
rade	0.0015									
	(0.346)									
govt		-0.0117**								
		(0.043)								
svng			0.0045***							
			(0.001)							
demoacc				0.3335***						
				(0.002)						
socioecon					0.0812					
					(0.673)					
intconf						0.4774***				
						(0.001)				
infcpi							-0.0000			
							(0.780)			
popn								0.0334		
								(0.183)		
prights									-0.2559**	
									(0.013)	
oda										-0.0070***
										(0.000)
Observations	213	203	203	152	152	152	199	215	215	214
Number of id	44	42	42	31	31	31	44	44	44	44
j	29	29	29	33	33	33	29	29	29	29
sarganp	2.99e-07	2.64e-06	7.92e-06	0	0	2.43e-08	0.00146	4.09e-06	2.05e-07	0.00191
hansenp	0.201	0.118	0.184	0.324	0.357	0.348	0.349	0.510	0.304	0.520
ar1p	0.143	0.0709	0.116	0.706	0.998	0.335	0.0622	0.0987	0.453	0.129
ar2p	0.296	0.280	0.260	0.631	0.797	0.237	0.291	0.334	0.220	0.184

Table A.9: Robustness Test for Corruption

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
L.lgdpcap	0.2002***	0.2249***	0.1546***	0.1035*	0.1103	0.0471	0.2158***	0.2756***	0.0121	0.0338
	(0.000)	(0.000)	(0.006)	(0.082)	(0.167)	(0.531)	(0.000)	(0.000)	(0.938)	(0.848)
lingdp	-0.2062***	-0.2110***	-0.1675***	-0.1568***	-0.1409**	-0.1188***	-0.2052***	-0.3464***	-0.0182	-0.0634
	(0.000)	(0.000)	(0.002)	(0.000)	(0.018)	(0.005)	(0.000)	(0.000)	(0.894)	(0.662)
fdi	0.0330***	0.0266**	0.0165	0.0074	0.0069	0.0135*	0.0298	0.0043	-0.0058	-0.0109
	(0.006)	(0.050)	(0.279)	(0.606)	(0.407)	(0.087)	(0.157)	(0.653)	(0.760)	(0.668)
corrup	0.0327	0.0905	0.0154	0.1496	0.0437	0.1283	-0.1420	-0.1425	0.3663	0.3938
	(0.780)	(0.456)	(0.899)	(0.632)	(0.812)	(0.630)	(0.412)	(0.408)	(0.150)	(0.223)
fdi_corrup	-0.0298	-0.0158	0.0147	0.0208	0.0444**	-0.0122	-0.0289	0.0744***	0.0823**	0.1153***
	(0.321)	(0.615)	(0.688)	(0.564)	(0.014)	(0.542)	(0.531)	(0.004)	(0.033)	(0.006)
trade	0.0002									
	(0.863)									
govt		-0.0091								
		(0.309)								
svng			0.0042**							
			(0.022)							
demoacc				0.5052**						
				(0.013)						
socioecon					0.3388*					
					(0.079)					
intconf						0.6427***				
						(0.008)				
infcpi							-0.0000**			
							(0.028)			
popn								0.1423***		
								(0.001)		
prights									-0.4212***	
									(0.006)	
oda										-0.0092***
										(0.005)
Observations	151	146	146	153	153	153	140	153	153	152
Number of id	31	30	30	31	31	31	31	31	31	31
j	33	33	33	37	37	37	29	29	29	29
sarganp	1.53e-05	4.78e-06	1.53e-05	2.11e-10	0	0	0.000802	7.70e-06	6.61e-08	1.69e-08
hansenp	0.490	0.470	0.518	0.668	0.597	0.594	0.409	0.539	0.324	0.240
ar1p	0.0342	0.0622	0.0887	0.238	0.251	0.155	0.0768	0.0354	0.218	0.210
ar2p	0.720	0.889	0.521	0.248	0.284	0.186	0.824	0.163	0.141	0.815

A.2 Appendix 2: FDI and Welfare

Table A.10: Detailed Summary Statistics for Welfare

	Welfare	FDI	Per Capita Income	Government Spending	Net Foreign Aid
Observations	1034	1026	1034	1034	1031
Mean	790.20	68.09	1234.98	264.10	69.64
Median	416.72	9.37	504.55	79.51	47.29
Std. Deviation	1243.28	264.02	2030.02	578.59	80.69
Skewness	5.69	7.71	3.29	4.90	3.61
Kurtosis	50.38	83.33	14.92	30.63	20.11
Minimum	56.32	-1198.61	69.24	1.80	-11.45
Maximum	14848.27	3903.48	14792.18	4743.57	714.91

Table A.11: Test for Heteroscedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity Ho: Constant variance Variables: fdicap fdi2 govcap popgrth inccap netodacap gfcf hcap ENGL
chi2(9) = 443.05 Prob > chi2 = 0.0000

The null hypothesis of no heteroscedasticity is soundly rejected at the 95% confidence level

Table A.12: Summary Statistics by Welfare Quantiles

1st Welfare Quantiles					
Variable	Obs	Mean	Std. Dev.	Min	Max
welfare	259	174.9022	39.1001	56.3157	236.9809
fdicap	255	10.1526	23.2490	-59.9553	143.1460
govcap	259	47.4472	87.6652	1.8022	986.6412
popgrth	259	2.9056	1.4892	-5.7296	10.2585
inccap	259	245.5771	115.1126	69.2362	923.0228
netodacap	259	41.7531	25.6373	2.6483	161.0914
gfcf	259	49.5807	46.5066	6.9843	504.2907
hcap	155	1.4862	0.2080	1.1318	1.8964
ENGL	259	0.3320	0.4719	0.0000	1.0000
2nd Welfare Quantiles					
Variable	Obs	Mean	Std. Dev.	Min	Max
welfare	258	314.7090	53.7568	237.7174	416.3544
fdicap	258	20.3034	55.8923	-3.4609	563.0040
govcap	258	75.3061	106.4252	8.3356	932.8846
popgrth	258	2.5896	1.1924	-7.5973	4.7743
inccap	258	395.2091	154.5752	89.8697	1551.0700
netodacap	258	54.4397	40.7128	1.2568	354.7738
gfcf	258	99.2959	165.3939	12.9062	1695.3340
hcap	191	1.6270	0.2984	1.1286	2.1678
ENGL	258	0.3798	0.4863	0.0000	1.0000
3rd Welfare Quantile					
Variable	Obs	Mean	Std. Dev.	Min	Max
welfare	259	545.7771	85.3590	417.0934	702.1008
fdicap	259	45.1038	149.3867	-79.0744	1751.2100
govcap	259	130.6872	104.2518	10.1935	871.0330
popgrth	249	2.5177	0.6849	0.1079	4.3752
inccap	259	725.5616	343.3850	206.1359	2463.1350
netodacap	259	60.9054	47.4576	1.3904	403.4556
gfcf	259	179.9576	249.7872	8.3892	2606.4510
hcap	195	1.8930	0.2906	1.3158	2.4823
ENGL	259	0.2973	0.4580	0.0000	1.0000
4th Welfare Quantiles					
Variable	Obs	Mean	Std. Dev.	Min	Max
welfare	258	2128.7620	1932.3290	702.3511	14848.2700
fdicap	254	198.2719	482.3520	-1198.6100	3903.4800
govcap	258	804.3068	960.0290	7.8106	4743.5650
popgrth	246	1.8448	0.8877	-2.6287	3.9284
inccap	258	3579.3960	2989.1250	470.4886	14729.1800
netodacap	255	122.2098	133.7417	-11.4543	714.9058
gfcf	258	1002.6870	947.6022	-609.5572	4788.4580
hcap	163	2.2895	0.2930	1.4334	2.8461
ENGL	258	0.4380	0.4971	0.0000	1.0000

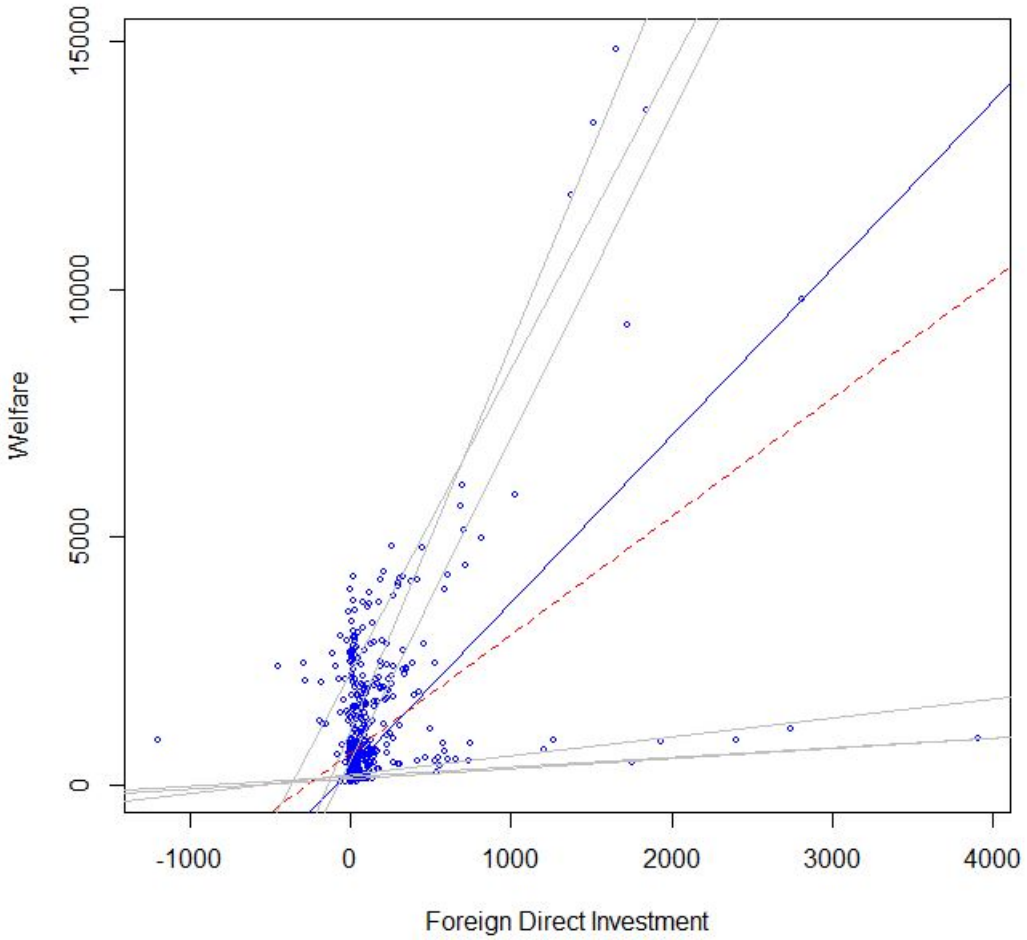

Figure A.5: Plots of the OLS and Quantile Regression Lines for the Different Quantiles

Table A.13: Baseline Model

Variables	(1) OLS	(2) OLS Robust	(3) QR05	(4) QR10	(5) QR25	(6) QR50	(7) QR75	(8) QR90	(9) QR95
fdicap	0.2607***	0.2607	-0.5251	-0.6807**	-0.5964**	-0.5469	0.0364	2.0314**	2.2926***
	(0.090)	(0.369)	(0.367)	(0.303)	(0.269)	(0.370)	(0.536)	(0.908)	(0.531)
govcap	1.1854***	1.1854***	0.3108	0.4903**	0.6439***	0.3656*	0.8696***	1.5485***	1.7211***
	(0.059)	(0.214)	(0.223)	(0.196)	(0.167)	(0.210)	(0.291)	(0.436)	(0.286)
popgrth	-96.5084***	-96.5084***	-10.5900**	-9.5295*	-21.7096***	-40.4858***	-39.7105***	-37.4840**	-48.6861***
	(17.121)	(31.326)	(4.729)	(5.751)	(8.254)	(10.590)	(12.545)	(14.673)	(14.592)
inccap	0.1717***	0.1717***	0.1798**	0.2178***	0.2372***	0.4342***	0.4646***	0.3937***	0.3621***
	(0.018)	(0.047)	(0.082)	(0.068)	(0.064)	(0.054)	(0.051)	(0.075)	(0.059)
netodacap	0.7406***	0.7406	0.6986***	0.7992***	0.8319***	0.6775***	0.4418***	0.2785	0.2104
	(0.272)	(0.695)	(0.222)	(0.175)	(0.219)	(0.182)	(0.160)	(0.242)	(0.188)
Constant	434.3885***	434.3885***	85.8813***	86.0904***	139.5784***	206.0301***	241.7160***	298.3588***	376.4335***
	(54.035)	(110.323)	(23.289)	(20.633)	(27.287)	(36.823)	(41.249)	(53.662)	(50.104)
Obs.	1,001	1,001	1,001	1,001	1,001	1,001	1,001	1,001	1,001
R-squared	0.765	0.765							

Results from the OLS and quantile regression estimate of a model of welfare. The dependent variable is welfare (measured a per capita household consumption expenditure) and the independent variables are per capita FDI, per capita government spending, population growth, per capita income and per capita net foreign aid. The OLS model is estimated first using normal standard errors and then with robust standard errors. The QR model is estimated for seven quantiles using bootstrap standard errors. Statdard errors are shown in parentheses. ***= at the 1% level, **= significant at the 5% level, and *= significant at the 10% level.

Table A.14: Controlling for Country's Legal Origin

Variables	(1) OLS	(2) OLS Robust	(3) QR05	(4) QR10	(5) QR25	(6) QR50	(7) QR75	(8) QR90	(9) QR95
fdicap	0.2719***	0.2719	-0.5171	**-0.6791****	**-0.6002****	-0.5455	-0.0211	**2.0880****	**2.2022*****
	(0.090)	(0.370)	(0.357)	(0.304)	(0.272)	(0.360)	(0.539)	(0.944)	(0.632)
govcap	1.1825***	1.1825***	0.3334	0.4990***	0.6386***	0.3647*	0.7840***	1.5116***	1.7643***
	(0.059)	(0.213)	(0.236)	(0.192)	(0.169)	(0.207)	(0.295)	(0.443)	(0.342)
popgrth	-93.4491***	-93.4491***	-7.9492**	-8.0847*	-21.8975***	-43.1077***	-38.7070***	-41.1148***	-40.4460**
	(17.152)	(31.511)	(4.004)	(4.442)	(8.142)	(10.412)	(11.964)	(15.261)	(17.129)
inccap	0.1721***	0.1721***	0.1788**	0.2180***	0.2391***	0.4345***	0.4770***	0.3992***	0.3628***
	(0.018)	(0.046)	(0.081)	(0.067)	(0.064)	(0.054)	(0.051)	(0.077)	(0.064)
netodacap	0.8259***	0.8259	0.5017**	0.6866***	0.8834***	0.6981***	0.4623***	0.3330	0.4016*
	(0.275)	(0.708)	(0.243)	(0.197)	(0.215)	(0.194)	(0.171)	(0.242)	(0.217)
ENGL	86.4787**	86.4787***	57.2813***	33.8569***	21.0626***	35.4817**	46.4562*	51.3317**	77.8128**
	(40.654)	(29.306)	(17.666)	(9.378)	(7.452)	(14.119)	(27.748)	(22.432)	(31.179)
Constant	388.5395***	388.5395***	67.2008***	79.5519***	129.9840***	202.1419***	223.9461***	286.3944***	312.2629***
	(58.086)	(116.765)	(22.818)	(17.317)	(25.821)	(35.767)	(39.592)	(50.202)	(58.051)
Observations	1,001	1,001	1,001	1,001	1,001	1,001	1,001	1,001	1,001
R-squared	0.766	0.766							

Table A.15: Controlling for Human Capital

Variables	(1) OLS	(2) OLS Robust	(3) QR05	(4) QR10	(5) QR25	(6) QR50	(7) QR75	(8) QR90	(9) QR95
fdicap	-0.8129***	-0.8129***	-0.3115	-0.4134*	-0.6576***	-0.7163***	-0.5604*	0.0247	1.0589*
	(0.151)	(0.195)	(0.218)	(0.213)	(0.190)	(0.239)	(0.307)	(0.550)	(0.629)
govcap	0.9934***	0.9934***	0.6302***	0.7694***	0.6210*	0.8167***	0.9437***	1.2868***	1.3993***
	(0.087)	(0.246)	(0.128)	(0.202)	(0.358)	(0.233)	(0.160)	(0.267)	(0.263)
popgrth	-38.4729***	-38.4729***	-10.7456*	-6.3877**	-4.7921	-12.2657**	-13.5927***	-18.0044***	-23.6274***
	(9.201)	(9.521)	(5.819)	(2.827)	(3.226)	(5.675)	(3.380)	(5.750)	(8.916)
inccap	0.2798***	0.2798***	0.1822***	0.1756***	0.2730***	0.4026***	0.4540***	0.4363***	0.4048***
	(0.016)	(0.057)	(0.038)	(0.053)	(0.099)	(0.058)	(0.031)	(0.046)	(0.049)
netodacap	-0.7151**	-0.7151**	0.0310	0.2005	-0.0283	-0.1502	-0.6796*	-0.7028*	-0.9085***
	(0.281)	(0.362)	(0.186)	(0.149)	(0.239)	(0.312)	(0.347)	(0.404)	(0.324)
hcap	171.1589***	171.1589***	113.1776***	99.5824***	104.1231***	86.3224***	105.4356***	139.9776***	201.0351**
	(39.302)	(27.131)	(26.957)	(17.048)	(17.438)	(23.468)	(23.836)	(34.991)	(78.034)
Constant	65.4600	65.4600	-58.7123	-39.0097	-25.5045	28.4137	60.3892	54.3785	35.1915
	(74.565)	(51.991)	(41.461)	(29.292)	(27.283)	(43.247)	(43.675)	(61.205)	(106.275)
Observations	697	697	697	697	697	697	697	697	697
R-squared	0.872	0.872							

Table A.16: Further Robustness Tests

Variables	(1) OLS	(2) OLS Robust	(3) QR05	(4) QR10	(5) QR25	(6) QR50	(7) QR75	(8) QR90	(9) QR95
fdicap	-0.0876	-0.0876	0.1314	0.1444	-0.3632	0.1174	0.4676**	0.8626***	0.9868***
	(0.210)	(0.277)	(0.462)	(0.427)	(0.393)	(0.303)	(0.234)	(0.272)	(0.336)
fdi^2	-0.0022***	-0.0022***	-0.0055**	-0.0022	-0.0012	-0.0021*	-0.0029***	-0.0032***	-0.0033***
	(0.000)	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)	(0.000)	(0.001)
govcap	0.8864***	0.8864***	0.4244**	0.4670**	0.2845	0.7551***	0.9036***	1.2788***	1.5636***
	(0.095)	(0.237)	(0.173)	(0.217)	(0.393)	(0.220)	(0.132)	(0.245)	(0.268)
popgrth	- 35.9783***	- 35.9783***	-8.5371*	-5.8886**	-5.2412	-10.7037**	-11.4309**	- 15.8516***	- 19.5148***
	(9.062)	(8.849)	(4.526)	(2.599)	(3.824)	(4.866)	(4.828)	(4.323)	(6.774)
inccap	0.2702***	0.2702***	0.2357***	0.2276***	0.2964***	0.3790***	0.4048***	0.3855***	0.3554***
	(0.017)	(0.059)	(0.046)	(0.053)	(0.096)	(0.065)	(0.032)	(0.050)	(0.054)
netodacap	-0.6549**	-0.6549*	0.1047	0.1604	-0.0843	-0.2868	-0.5346*	-0.7304***	-0.7488***
	(0.277)	(0.370)	(0.185)	(0.137)	(0.268)	(0.340)	(0.295)	(0.264)	(0.237)
gfcf	0.1412**	0.1412	0.0909	0.0815	0.1726	0.1860	0.2221***	0.2055*	0.1439
	(0.056)	(0.089)	(0.128)	(0.149)	(0.218)	(0.161)	(0.083)	(0.109)	(0.100)
hcap	170.6766***	170.6766***	74.1569*	85.5071***	140.6245***	107.9304***	111.9647***	118.9251***	160.4205***
	(40.421)	(28.032)	(40.359)	(23.960)	(25.905)	(24.198)	(24.488)	(26.747)	(46.046)
ENGL	-29.1262	-29.1262	-10.0821	-19.3417**	- 35.6545***	-33.2195**	-14.8938	10.1011	42.0391*
	(24.268)	(19.779)	(14.025)	(9.573)	(13.434)	(13.046)	(18.013)	(18.360)	(24.306)
Constant	58.9063	58.9063	-6.2010	-13.5298	-64.7771*	-2.9238	30.1616	73.6420	49.1316
	(74.100)	(50.167)	(60.514)	(38.349)	(33.556)	(41.166)	(42.302)	(47.782)	(73.806)
Observations	697	697	697	697	697	697	697	697	697
R-squared	0.877	0.877							

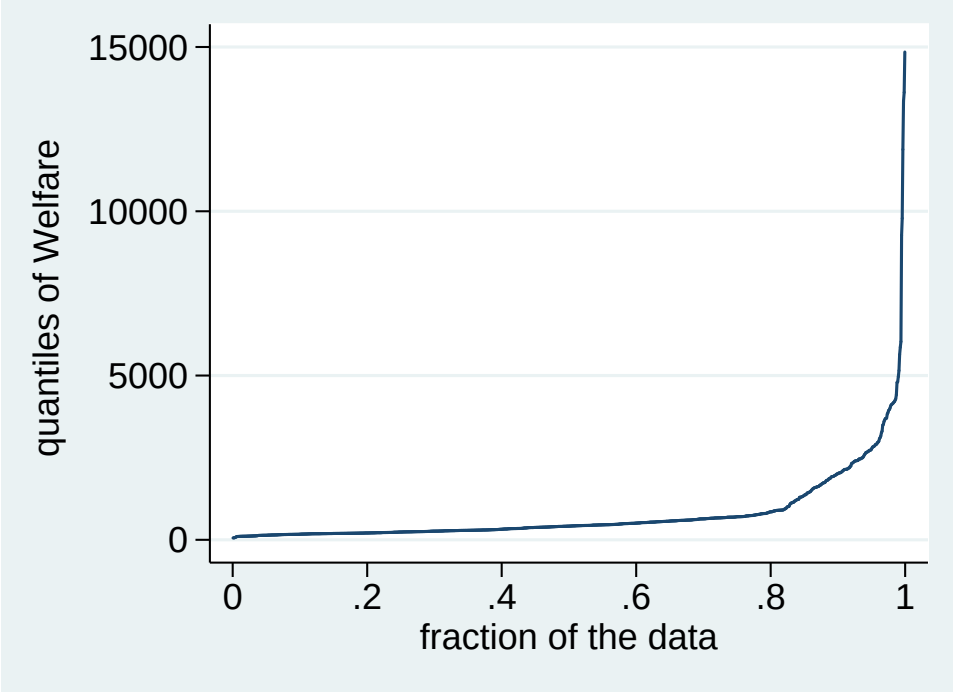

Figure A.6: Quantile Plot of Welfare Showing the Distribution of Welfare

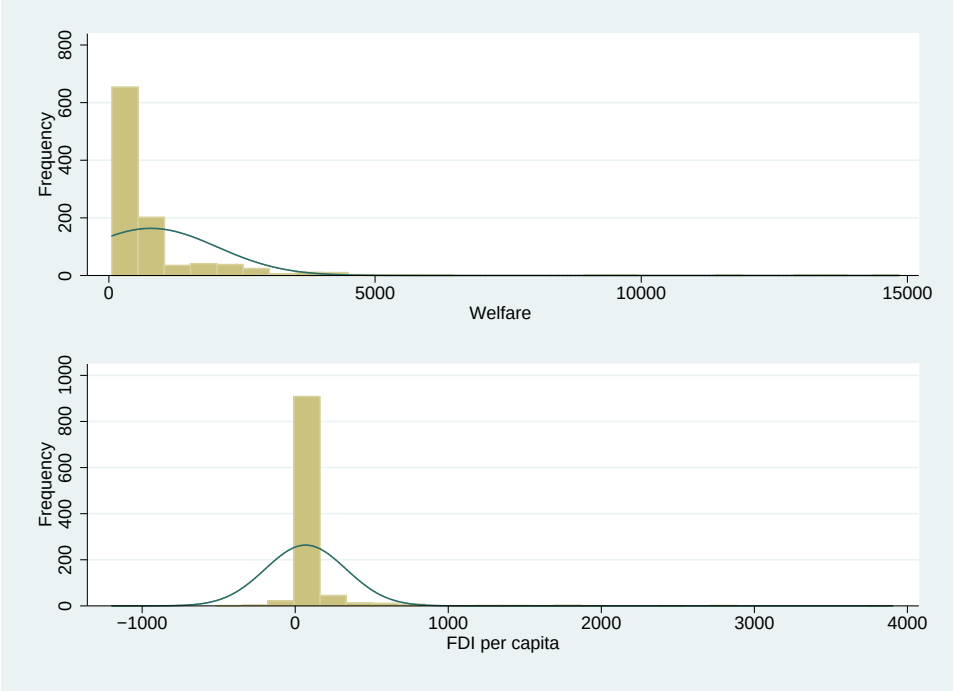

Figure A.7: Histograms of Welfare and FDI per Capita

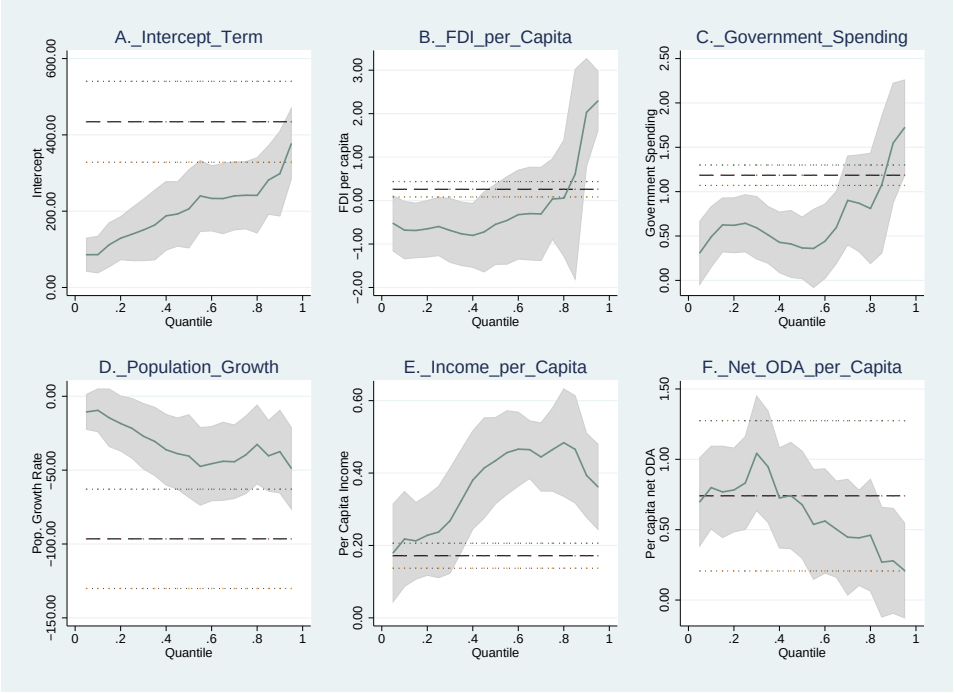

Figure A.8: Graph of QR Results for Selected Explanatory Variables